

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of)	
)	
Amendment of Parts 2, 25, and 87 of the)	
Commission's Rules to Implement Decisions from)	
World Radiocommunication Conferences	)	ET Docket No. 02-305
Concerning Frequency Bands Between 28 MHz)	
and 36 GHz and to Otherwise Update the Rules in)	
this Frequency Range)	
)	
Amendment of Parts 2 and 25 of the)	
Commission's Rules to Allocate Spectrum For	)	RM-10331
Government and Non-Government Use in the)	
Radionavigation-Satellite Service)	

REPORT AND ORDER

Adopted: October 31, 2003

Released: November 4, 2003

By the Commission:

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INTRODUCTION

1. By this action, we amend Parts 2, 25, and 87 of our Rules to implement domestically various allocation decisions from several World Radiocommunication Conferences (“WRCs”) concerning the frequency bands between 28 MHz and 36 GHz, and to otherwise update our Rules in this frequency range. The following actions are the most significant to non-Federal Government operations: (1) implementation of generic mobile-satellite service (“MSS”) allocations in the bands 1525-1559 MHz and 1626.5-1660.5 MHz (“L-band”); (2) allocation of the band 1164-1215 MHz to the radionavigation-satellite service (“RNSS”); (3) deletion of unused and limited fixed-satellite service (“FSS”) and broadcasting-satellite service (“BSS”) allocations from the band 2500-2690 MHz; and (4) upgrade of the Earth exploration-satellite service (“EESS”) allocation in the band 25.5-27 GHz from secondary to primary. In addition, at the request of the National Telecommunications and Information Administration (“NTIA”), we implement various allocation changes for the space science services and the inter-satellite service (“ISS”), most of which involve spectrum primarily used by the Federal Government.¹ These actions conform our Rules to previous WRC decisions and are expected to provide significant benefits to the American public.

EXECUTIVE SUMMARY

2. In this Report and Order (“R&O”), we provide for generic MSS allocations across all of the frequencies in the bands 1525-1559 MHz and 1626.5-1660.5 MHz. Specifically, we expand the primary allocation in the bands 1545-1549.5 MHz, 1558.5-1559 MHz, 1646.5-1651 MHz, and 1660-1660.5 MHz from the aeronautical mobile-satellite (route) service (“AMS(R)S”) to all services within the MSS while preserving the status of AMS(R)S. The effect of this action is that the bands 1545-1559 MHz and 1646.5-1660.5 MHz will be made available to all types of MSS communications on a primary basis, rather than segmented for specialized use. This action permits more efficient use of this radio spectrum and facilitates the expansion of MSS use globally. In addition, we delete the existing primary maritime mobile-satellite service (“MMSS”) and MSS allocations in the bands 1530-1544 MHz and 1626.5-1645.5 MHz, as they would now be superfluous. We also delete the secondary allocation for aeronautical telemetry from the band 1525-1535 MHz to remove potentially conflicting allocations.

3. We allocate the band 1164-1215 MHz to the RNSS for space-to-Earth (“downlink”) and space-to-space transmissions in order to accommodate a new civil global positioning system (“GPS”) signal.² This action permits the addition of GPS signal “L5,” which supports the safety-of-life requirements demanded by civil aviation. We also allocate the bands 1215-1240 MHz and 1559-1610 MHz, which are currently limited to RNSS downlinks, for RNSS space-to-space transmissions as well. This action allows use of spaceborne RNSS receivers for scientific and commercial applications.

4. We delete the flight test and radiolocation allocations in the band 2320-2345 MHz because of the potential for conflict between these services and the Satellite Digital Audio Radio Service

¹ The Commission, which is an independent agency, administers non-Federal Government spectrum and NTIA, which is an operating unit of the Department of Commerce, administers Federal Government spectrum. *See* 47 C.F.R. § 2.105(a). NTIA also approves the spectrum needs of new systems for use by Federal departments and agencies and maintains the Federal Government Table of Frequency Allocations in its *Manual of Regulations and Procedures for Federal Radio Frequency Management* (“NTIA Manual”).

² RNSS is a radiocommunication service for the purpose of radiodetermination involving the use of one or more space stations. This service may also include feeder links necessary for its own operation. Radiodetermination is the determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation properties of radio waves. *See* 47 C.F.R. § 2.1.

(“Satellite DARS”), which has been brought into operation in this band. We also delete the unused FSS and BSS allocations from the band 2500-2690 MHz in order to remove allocations that are not compatible with two-way fixed and mobile operations that are operating and anticipated in the band.

5. We further implement domestically various allocation decisions from several WRCs concerning the space science services and the ISS. In this regard, we take the following actions:

- Revise secondary allocations for the Federal Government EESS³ and the Federal Government space research service (“SRS”)⁴ from secondary to primary status in 950 megahertz of spectrum in eight frequency bands and specify that these allocations are to be used for active sensor operations (“EESS (active)” and “SRS (active)”):⁵ 5250-5255 MHz, 5255-5350 MHz, 8550-8650 MHz, 9500-9800 MHz, 13.4-13.75 GHz, and 17.2-17.3 GHz.
- Modify the non-Federal Government/Federal Government shared allocations at 13.25-13.4 GHz and 35.6-36 GHz to provide flexibility for the Federal Government to use 550 megahertz of additional spectrum for EESS (active) and SRS (active) on a primary basis, and change the primary footnote allocation for active spaceborne sensors in the band 35.5-35.6 GHz to a direct Table listing.
- Modify the non-Federal Government/Federal Government shared allocation at 5350-5460 MHz to provide flexibility for the Federal Government to use 110 megahertz of additional spectrum for the EESS (active) on a primary basis.
- Modify the non-Federal Government/Federal Government shared allocation at 401-403 MHz to provide flexibility for the Federal Government to use EESS uplinks and meteorological-satellite service (“METSAT”) uplinks on a primary basis.⁶
- Modify the non-Federal Government/Federal Government shared allocation at 410-420 MHz to provide flexibility for the Federal Government to use the SRS on a primary basis for space-to-space transmissions.
- Modify the non-Federal Government/Federal Government shared allocation at 7750-7850 MHz to provide flexibility for the Federal Government to use METSAT downlinks on a primary basis, limited to non-geostationary satellite systems.
- Modify the non-Federal Government/Federal Government shared allocation at 8400-8450 MHz to provide flexibility for the non-Federal Government to use SRS downlinks from deep space on a secondary basis.
- Modify the non-Federal Government/Federal Government shared allocation at 25.25-27.5 GHz to provide flexibility for the Federal Government to use the ISS on a primary basis.
- Revise the EESS allocation from secondary to primary status in the band 25.5-27 GHz and change the directional indicator from space-to-space to space-to-Earth.

³ EESS is a radiocommunication service between earth stations and one or more space stations, which may include links between space stations, in which (1) information relating to the characteristics of the Earth and its natural phenomena, including data relating to the state of the environment, is obtained from active or passive sensors on Earth satellites; (2) similar information is collected from airborne or Earth-based platforms; (3) such information may be distributed to earth stations within the system concerned; and (4) platform interrogation may be included. This service may also include feeder links necessary for its operation. *See* 47 C.F.R. § 2.1.

⁴ SRS is a radiocommunication service in which spacecraft or other objects in space are used for scientific or technological research purposes. *See* 47 C.F.R. § 2.1.

⁵ An active sensor is an EESS or SRS measuring instrument in which information is obtained by transmission and reception of radio waves. *See* 47 C.F.R. § 2.1.

⁶ The meteorological-satellite service is an EESS used for meteorological purposes. *See* 47 C.F.R. § 2.1.

6. In addition, we: (1) delete the primary ISS shared allocation from the band 32-32.3 GHz; (2) delete the secondary AMS(R)S allocation from the band 136-137 MHz; (3) more than double the size of the geographic area in New Mexico and Texas where amateur stations in the band 420-450 MHz will be limited in power and where spread spectrum radiolocation systems in the sub-band 420-435 MHz should not expect to be accommodated; (4) modify our rules to reflect NTIA's recent action, which specified that Federal Government wind profiler radars ("WPRs")⁷ will operate in the sub-band 448-450 MHz; (5) permit U.S. flagged ships to use more spectrum-efficient equipment for on-board mobile radiotelephony communications in areas outside the territorial waters of the United States; (6) delete unused allocations for the International Fixed Public Radiocommunication Services ("IFPRS") from the bands 2.1-2.2 GHz and 10.7-11.7 GHz; and (7) allocate the band 14-14.5 GHz to the MSS (Earth-to-space), which includes aeronautical mobile-satellite service ("AMSS"), on a secondary basis. We also make numerous ministerial amendments to Part 2 of our Rules.

DISCUSSION

7. In response to various petitions for rulemaking, the Commission has addressed in a number of proceedings many allocation changes that resulted from the 1992 World Administrative Radio Conference ("WARC-92") and the 1995 and 1997 World Radiocommunication Conferences ("WRC-95" and "WRC-97").⁸ In the *Notice of Proposed Rule Making* ("Notice") in this proceeding, the Commission turned to additional allocation changes from these conferences that have not previously been considered, including several changes sought mainly at the request of NTIA.⁹ The *Notice* also addressed the RNSS allocation changes from the 2000 World Radiocommunication Conference ("WRC-2000"),¹⁰ a Petition for Rule Making filed by the Lockheed Martin Corporation ("Lockheed Martin") requesting that the WRC-2000 RNSS allocations in the bands 1164-1215 MHz and 1559-1610 MHz be implemented domestically and that these frequency bands be added to Part 25 of the Commission's Rules,¹¹ and some non-WRC allocation issues that concern the frequency bands between 28 MHz and 36 GHz. These issues included downgrading the primary flight test and radiolocation allocations in the band 2320-2345 MHz to secondary status, deleting the limited BSS and FSS allocations from the band 2500-2690 MHz, deleting unused IFPRS allocations from the bands 2.1-2.2 GHz and 10.7-11.7 GHz, and making various ministerial amendments to clean up and update the Rules.

A. Generic MSS at L-Band

8. *Background.* In the United States, the bands 1530-1544 MHz (downlinks) and 1626.5-1645.5 MHz (uplinks) are allocated to the MMSS and the MSS on a co-primary basis.¹² Through its

⁷ WPRs use sensitive Doppler radar to measure wind speed and direction at a variety of altitudes.

⁸ See *Final Acts of the World Administrative Radio Conference for Dealing with Frequency Allocations in Certain Parts of the Spectrum (WARC-92)*, Malaga-Torremolinos, 1992 ("*WARC-92 Final Acts*"); *Final Acts of the World Radiocommunication Conference (WRC-95)*, Geneva, 1996 ("*WRC-95 Final Acts*"); and *Final Acts of the World Radiocommunication Conference (WRC-97)*, Geneva, 1997 ("*WRC-97 Final Acts*").

⁹ See *Notice of Proposed Rule Making*, ET Docket No. 02-305, 17 FCC Rcd 19756 (2002).

¹⁰ See *Final Acts of the World Radiocommunication Conference (WRC-2000)*, Istanbul, 2000 ("*WRC-2000 Final Acts*").

¹¹ See Lockheed Martin Petition for Rule Making, September 28, 2001. This petition was designated as RM-10331 and placed on public notice on November 15, 2001. See Rep. No. 2512.

¹² See Table, *infra*, which follows ¶ 20.

adoption of footnote US315,¹³ the Commission requires that MMSS distress and safety communications have priority access and real-time preemptive capability in these bands over MSS routine, non-safety related public correspondence.¹⁴ In addition, the band 1525-1530 MHz is allocated to the MSS on a primary basis and the band 1525-1535 MHz is allocated to the mobile service on a secondary basis, limited to aeronautical telemetry. Footnote US78 states, *inter alia*, that permissible use of the frequency 1525.5 MHz includes telemetry associated with launching and reentry into the Earth's atmosphere, as well as any incidental orbiting prior to reentry, of "manned objects" undergoing flight tests.¹⁵ Together, the 1525-1544 MHz and 1626.5-1645.5 MHz bands are known as "lower L-band."

9. The bands 1544-1545 MHz (downlinks) and 1645.5-1646.5 MHz (uplinks) are allocated to the MSS on an exclusive primary basis. Through footnotes 5.356 and 5.375, the Commission requires that the use of these bands be limited to distress and safety communications.

10. The bands 1545-1559 MHz (downlinks) and 1646.5-1660.5 MHz (uplinks) are allocated to the AMS(R)S on a primary basis and are known as "upper L-band."¹⁶ Most of upper L-band is also allocated to the MSS, as follows: the bands 1545-1549.5 MHz (downlinks) and 1646.5-1651 MHz (uplinks) are allocated on a secondary basis, and the bands 1549.5-1558.5 MHz (downlinks) and 1651-1660 MHz (uplinks) are allocated on a primary basis. Through its adoption of footnote US308, the Commission specifies that AMS(R)S requirements that cannot be accommodated in the dedicated AMS(R)S bands (1558.5-1559 MHz and 1660-1660.5 MHz) or in the secondary MSS bands (1545-1549.5 MHz and 1646.5-1651 MHz) have priority access and real-time preemptive capability over routine, non-safety related public correspondence in the primary MSS bands (1549.5-1558.5 MHz and 1651-1660 MHz).¹⁷

11. WRC-97 allocated the bands 1525-1559 MHz (downlinks) and 1626.5-1660.5 MHz (uplinks) to the MSS on a primary basis throughout the world.¹⁸ The general structure of the MSS

¹³ Footnote US315 reads as follows: In the frequency bands 1530-1544 MHz and 1626.5-1645.5 MHz maritime mobile-satellite distress and safety communications, *e.g.*, GMDSS, shall have priority access with real-time preemptive capability in the mobile-satellite service. Communications of mobile-satellite system stations not participating in the GMDSS shall operate on a secondary basis to distress and safety communications of stations operating in the GMDSS. Account shall be taken of the priority of safety-related communications in the mobile-satellite service. *See* 47 C.F.R. § 2.106.

¹⁴ Public correspondence is any telecommunication which the offices and stations must, by reason of their being at the disposal of the public, accept for transmission. *See* 47 C.F.R. § 2.1.

¹⁵ Footnote US78 reads as follows: "In the mobile service, the frequencies between 1435 and 1535 MHz will be assigned for aeronautical telemetry and associated telecommand operations for flight testing of manned or unmanned aircraft and missiles, or their major components. Permissible usage includes telemetry associated with launching and reentry into the Earth's atmosphere as well as any incidental orbiting prior to reentry of manned objects undergoing flight tests. The following frequencies are shared with flight telemetry mobile stations: 1444.5, 1453.5, 1501.5, 1515.5, 1524.5 and 1525.5 MHz." *See* 47 C.F.R. § 2.106, footnote US78.

¹⁶ AMS(R)S is an aeronautical mobile-satellite service reserved for communications relating to safety and regularity of flights, primarily along national or international civil air routes. *See* 47 C.F.R. § 2.106.

¹⁷ Footnote US308 reads as follows: In the frequency bands 1549.5-1558.5 MHz and 1651-1660 MHz, the Aeronautical-Mobile-Satellite (R) requirements that cannot be accommodated in the 1545-1549.5 MHz, 1558.5-1559 MHz, 1646.5-1651 MHz and 1660-1660.5 MHz bands shall have priority access with real-time preemptive capability for communications in the mobile-satellite service. Systems not interoperable with the aeronautical mobile-satellite (R) service shall operate on a secondary basis. Account shall be taken of the priority of safety-related communications in the mobile-satellite service. *See* 47 C.F.R. § 2.106.

¹⁸ *See WRC-97 Final Acts* at 27-32.

allocation emphasizes safety communications for MMSS in much of lower L-band through the adoption of footnote 5.353A and for AMS(R)S in upper L-band through the adoption of footnotes 5.357A and 5.362A.¹⁹

12. In February 2002, the Commission established licensing policies to govern MSS use of upper and lower L-bands.²⁰ Specifically, the Commission assigned up to 20 megahertz of the upper and lower L-band spectrum to Motient Services, Inc. (now Mobile Satellite Ventures Subsidiary, LLC or “MSV”), the only U.S. MSS system currently authorized in L-band. The Commission also incorporated into Part 25 of its Rules specific operational parameters and technical requirements to ensure that the integrity of maritime distress and safety communications will not be compromised by MSS operation in the lower L-band.²¹

13. *Proposals.* Domestically, the Commission has previously implemented generic MSS proposals in portions of the L-band. However, routine, non-safety related MSS public correspondence is currently precluded in the uppermost one megahertz of upper L-band spectrum (1558.5-1559 MHz and 1660-1660.5 MHz) and may be provided in nine megahertz of additional upper L-band spectrum only on a secondary basis (1545-1549.5 MHz and 1646.5-1651 MHz). Accordingly, the Commission proposed in the *Notice* to expand the permitted primary services from AMS(R)S to all MSS in the bands 1545-1549.5 MHz, 1558.5-1559 MHz, 1646.5-1651 MHz, and 1660-1660.5 MHz.²²

14. In addition, the Commission proposed to take the following non-substantive, “clean-up” actions: (1) delete the superfluous MMSS allocations from bands 1530-1544 MHz and 1626.5-1645.5 MHz, (2) delete the superfluous secondary MSS allocations from the bands 1545-1549.5 MHz and 1646.5-1651 MHz, and (3) delete the superfluous AMS(R)S allocations from the bands 1549.5-1558.5 MHz and 1651-1660 MHz.²³ The effect of these proposals is that the band 1525-1559 MHz would be allocated for MSS downlinks on a primary basis and the band 1626.5-1660.5 MHz would be allocated for MSS uplinks on a primary basis.²⁴

15. The Commission proposed to maintain footnotes US308 and US315 concerning the priority to be afforded distress and safety communications, stating that it believed that these generic MSS allocations would provide MSV and others with maximum flexibility, without hindering the use of this spectrum for distress and safety communications. The Commission requested comment on whether footnote US308 should be modified or replaced by international footnotes 5.357A²⁵ and 5.362A.²⁶ The

¹⁹ See 47 C.F.R. § 2.106, footnotes 5.353A, 5.357A, and 5.362A.

²⁰ See *Establishing Rules and Policies for the use of Spectrum for Mobile Satellite Services in the Upper and Lower L-band*, IB Docket No. 96-132, *Report and Order*, FCC 02-24, released February 7, 2002 (“*L-band Policy and Rules R&O*”).

²¹ *Id.* at Appendix A, Section 25.136(d) and (e).

²² *Notice* at 19763.

²³ Because the proposal referenced in the preceding paragraph is to expand AMS(R)S to all MSS in the bands 1545-1549.5 MHz and 1646.5-1651 MHz, AMS(R)S would also be deleted from those bands.

²⁴ *Notice* at 19763.

²⁵ Footnote 5.357A reads as follows: In applying the procedures of Section II of Article 9 to the mobile-satellite service in the bands 1545-1555 MHz and 1646.5-1656.5 MHz, priority shall be given to accommodating the spectrum requirements of the aeronautical mobile-satellite (R) service providing transmission of messages with priority 1 to 6 in Article 44. Aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article 44 shall have priority access and immediate availability, by pre-emption if necessary, over all other mobile-satellite communications operating within a network. Mobile-satellite systems shall not cause unacceptable interference to,

Commission also proposed to update Part 25 of its Rules by stating that the bands 1525-1559 MHz and 1626.5-1660.5 MHz are available for use by L-band MSS systems and that use of the bands 1544-1545 MHz and 1645.5-1646.5 MHz is limited to distress and safety communications.²⁷

16. The Commission also requested comment on whether the secondary mobile allocation, which is limited to aeronautical telemetry in the band 1525-1535 MHz, should be deleted in the United States Table of Frequency Allocations (“U.S. Table”) and on whether co-frequency transmissions from aircraft can cause harmful interference to the MSS. Consistent with this proposal, the Commission also proposed to revise footnote US78 to remove the frequency 1525.5 MHz, which can be used for both aircraft and spacecraft telemetry.²⁸ The Commission further requested comment on whether the aeronautical telemetry operations in the band 1525-1535 MHz can be relocated to either the band 1435-1525 MHz or to the band 2310-2385 MHz.²⁹

17. Commenters generally support the proposals set forth in the *Notice*. The Boeing Company (“Boeing”) states that for many years the Commission has supported the adoption of generic MSS L-band allocations that accommodate a range of communications requirements in a flexible and economic manner.³⁰ Inmarsat Ventures PLC (“Inmarsat”) supports the adoption of generic MSS allocations that are consistent with the decisions of WRC-97 and WRC-2000.³¹ MSV states that a generic MSS allocation in the L-band will provide MSS licensees with maximum flexibility without limiting use of this spectrum for distress and safety communications.³² Boeing, Inmarsat, MSV, and the Aerospace and Flight Test Radio Coordinating Council (“AFTRCC”) also support the deletion of the secondary aeronautical telemetry allocation from the band 1525-1535 MHz. Boeing states that this band is unusable for secondary aeronautical telemetry because of the operation of primary services in the band;³³ Inmarsat cites potential harmful interference that the aeronautical telemetry service could cause to Inmarsat’s mobile earth stations and could receive from MSS satellites in the band;³⁴ MSV states that aeronautical

or claim protection from, aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article 44. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. (The provisions of Resolution 222 (WRC-2000) shall apply.)

²⁶ Footnote 5.362A reads as follows: In the United States, in the bands 1555-1559 MHz and 1656.5-1660.5 MHz, the aeronautical mobile-satellite (R) service shall have priority access and immediate availability, by pre-emption if necessary, over all other mobile-satellite communications operating within a network. Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article 44. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services.

²⁷ *Notice* at 19763.

²⁸ *Id.* at 19763-64.

²⁹ *Id.* The band 2310-2385 MHz is further discussed in Section III.C, *infra*.

³⁰ Boeing Comments at 5.

³¹ Inmarsat Comments at 1.

³² MSV Reply Comments at 5.

³³ Boeing Comments at 7.

³⁴ Inmarsat Comments at 3-4.

telemetry users themselves favor deletion of the secondary allocation in the band,³⁵ and AFTRCC states that its members have vacated this band and moved to the band 1435-1525 MHz.³⁶

18. Boeing supports deleting footnote US308 and Inmarsat supports deleting both footnotes US308 and US315. Boeing argues that the United States participated in the development of International Telecommunication Union-Radiocommunication Sector (“ITU-R”) footnotes 5.357A and 5.362A, which, Boeing maintains, generally embrace the scope of US308. Accordingly, Boeing recommends deleting US308 and incorporating by reference 5.357A and 5.362A in the U.S. Table.³⁷ Inmarsat contends that footnotes US308 and US315 imply a requirement for intersystem preemptive capability in the MSS that is infeasible because the ITU-R has not been able to determine how to establish a workable method of real-time preemption. Inmarsat also contends that these two US footnotes put certain MSS communications on a secondary basis with respect to the Global Maritime Distress and Safety System (“GMDSS”) and AMS(R)S. Specifically, Inmarsat claims that footnote US315 gives all non-GMDSS communications a secondary status, which, Inmarsat maintains, conflicts with the *Notice*’s generic MSS allocation proposal; and that footnote US308 places systems not interoperable with AMS(R)S on a secondary basis, which, Inmarsat maintains, implies an inter-system preemption capability.³⁸ Therefore, Inmarsat recommends deleting these footnotes to resolve potential conflicts between them and adoption of the generic MSS proposal.³⁹ Inmarsat further recommends deleting footnote US309, which authorizes transmissions from terrestrial aeronautical stations directly to aircraft stations or between aircraft stations in the AMS(R)S in the 1545-1559/1646.5-1660.5 MHz Upper L-band, to extend or supplement satellite-to-aircraft links. Inmarsat states that it is unaware of any use of these terrestrial links, but that if there is a need to maintain a footnote to address such use, international footnotes 5.357⁴⁰ and 5.376⁴¹ should replace US309.⁴²

19. In reply comments, MSV urges the retention of footnotes US308, US315, and US309. MSV contends that the language in footnotes US308 and US315 has been codified for more than 15 and nine years, respectively, and is reasonably well-understood. MSV asserts that deleting these footnotes would introduce uncertainty without any apparent benefit. Further, MSV contends that Inmarsat is incorrect when it contends that these footnotes require intersystem preemption. MSV maintains that, despite the language in the footnotes that reference system interoperability, intersystem preemption is not required today in the United States.⁴³ MSV argues that footnote US309 is superior to international footnotes 5.357 and 5.376 because it allows for operation of aeronautical stations throughout the entire 28

³⁵ MSV Reply Comments at 6.

³⁶ AFTRCC Comments at 2.

³⁷ Boeing Comments at 6.

³⁸ Inmarsat Comments at 5-6.

³⁹ *Id.* at 4.

⁴⁰ Footnote 5.357 reads as follows: Transmissions in the band 1545-1555 MHz from terrestrial aeronautical stations directly to aircraft stations, or between aircraft stations, in the aeronautical mobile (R) service are also authorized when such transmissions are used to extend or supplement the satellite-to-aircraft links.

⁴¹ Footnote 5.376 reads as follows: Transmissions in the band 1646.5-1656.5 MHz from aircraft stations in the aeronautical mobile (R) service directly to terrestrial aeronautical stations, or between aircraft stations, are also authorized when such transmissions are used to extend or supplement the aircraft-to-satellite links.

⁴² Inmarsat Comments at 6.

⁴³ MSV Reply Comments at 6-7.

megahertz of upper L-band spectrum at 1545-1559 MHz and 1646.5-1660.5 MHz, whereas the international footnotes limit such operation to only the bands 1545-1555 MHz and 1646.5-1656.5 MHz.⁴⁴

20. *Decision.* We are adopting the generic MSS allocation proposal for the bands 1525-1559 MHz/1626.5-1660.5 MHz set forth in the *Notice*, deleting the secondary aeronautical telemetry allocation from the band 1525-1535 MHz and revising footnote US78 to remove the frequency 1525.5 MHz, and retaining footnotes US308 and US315. Commenters express strong support for a generic MSS allocation and deletion of the secondary aeronautical telemetry allocation, and we find that these changes will enhance flexibility and efficiency in the bands 1525-1559 MHz and 1626.5-1660.5 MHz. While there is a difference of opinion regarding the desirability of retaining footnotes US308 and US315, we concur with MSV that the advantages of retaining them outweigh the disadvantages. As noted by MSV, footnotes US308 and US315 are long-standing and replacement of them by international footnotes 5.357A and 5.362A, which have different language, would introduce confusion as to whether policy changes were being made. Further, sections 25.136(d) and (e) of the Commission's Rules set forth specific requirements for MSS mobile and land earth stations that satisfy the priority and preemption requirements of footnote US315.⁴⁵ Regarding footnote US309, we concur with MSV that this footnote allows terrestrial stations in the AMS(R)S to operate in more of the band than international footnotes 5.357A and 5.362A, in order to supplement satellite-to-aircraft links in that service. The broader spectrum range allowed by US309 is more consistent with the Commission's decision to expand AMS(R)S use within a generic MSS allocation. Thus, we decline to modify US309, which we did not propose to change in the *Notice*. Accordingly, we are retaining footnotes US308, US315, and US309. The table below shows the changes that we are making herein to the bands 1525-1559 MHz/1626.5-1660.5 MHz.

⁴⁴ *Id.* at 7.

⁴⁵ See 47 C.F.R. §§ 25.136(d), (e).

Table: Generic MSS
(All allocations are primary, except as noted)

Band (MHz)	Existing Allocations	Revised Allocations	Summary of Main Changes
1525-1530	MSS (downlinks) US380 (non-Federal Government licensee may also operate ATC with MSS network subject to particular rules) Secondary mobile (aeronautical telemetry) 5.341 (Passive research is being conducted in a search for intentional emissions of extraterrestrial origins) 5.351 (Band may not be used for feeder links.) US78 (permissible usage includes spacecraft telemetry)	1525-1535 MHz MSS (downlinks) US315 US380 5.341 5.351	Secondary mobile allocation in the band 1525-1535 MHz that was limited to aeronautical telemetry is deleted and US 78 modified to reflect this change. Superfluous MMSS allocation in the band 1530-1544 MHz is deleted.
1530-1535	MSS (downlinks) US380 MMSS (downlinks) Secondary mobile (aeronautical telemetry) 5.341 5.351 US78 US315 (MMSS distress & safety has priority access & real-time pre-emptive capability over other MSS)		
1535-1544	MSS (downlinks) US380 MMSS (downlinks) 5.341 5.351 US315	1535-1559 MHz MSS (downlinks) US308 US309 US315 US380	
1544-1545	MSS (downlinks) 5.341 5.356 (limits use to distress and safety communications)	5.341 5.351 5.356	No change.
1545-1549.5	AMS(R)S (downlinks) Secondary MSS (downlinks) US380 5.341 5.351 US308 (AMS(R)S has priority access and real-time preemptive capability over other MSS) US309 (terrestrial extension of AMS(R)S permitted)		Limited AMS(R)S is replaced by generic MSS in the bands 1545-1549.5 MHz & 1558.5-1559 MHz; superfluous allocations are deleted.
1549.5-1558.5	AMS(R)S (downlinks) MSS (downlinks) US380 5.341 5.351 US308 US309		
1558.5-1559	AMS(R)S (downlinks) 5.341 5.351 US308 US309 US380		
1626.5-1645.5	MSS (uplinks) US380 MMSS (uplinks) 5.341 5.351 US315	1626.5-1660 MHz MSS (uplinks) US308 US309 US315 US380	Superfluous MMSS allocation in the band 1626.5-1645.5 MHz is deleted.
1645.5-1646.5	MSS (uplinks) 5.341 5.375 (limits use to distress and safety communications)	5.341 5.351 5.375	No change.
1646.5-1651	AMS(R)S (uplinks) Secondary MSS (uplinks) US380 5.341 5.351 US308 US309		Limited AMS(R)S is replaced by generic MSS in the bands 1646.5-1651 MHz & 1600-1660.5 MHz; superfluous allocations are deleted.
1651-1660	AMS(R)S (uplinks) MSS (uplinks) US380 5.341 5.351 US308 US309		
1660-1660.5	AMS(R)S (uplinks) RADIO ASTRONOMY 5.149 5.341 5.351 US308 US309 US380	MSS (uplinks) US308 US309 US380 RADIO ASTRONOMY 5.341 5.351 US342	5.149 has been replaced by US342 to better address RAS.

B. RNSS Allocations

21. *Background.* GPS, which currently consists of 24 satellites operated by the U.S. Government, is authorized under the RNSS allocation. This constellation of satellites allows any person with a GPS receiver to determine his or her precise longitude, latitude, altitude, and time anywhere on the planet.⁴⁶ GPS currently uses the RNSS downlink allocations in the bands 1215-1240 MHz and 1559-1610 MHz. GPS provides two levels of service: a Standard Positioning Service (“SPS”) using the “L1” frequency⁴⁷ and a Precise Positioning Service (“PPS”) using the L1 and “L2” frequencies.⁴⁸ SPS is available to all users on a continuous, worldwide basis, free of any direct user charge.

22. At WRC-2000, the U.S. proposed to add a third civil GPS signal (“L5”) that can meet the needs of critical safety-of-life applications, such as civil aviation, on satellites scheduled for launch beginning in 2007. The U.S. stated that the required bandwidth of this signal is 24 megahertz. However, WRC-2000 adopted international footnote 5.328A, which allocates a wider band to accommodate such use. Specifically, WRC-2000 allocated the band 1164-1215 MHz for RNSS downlinks and space-to-space transmissions on a primary basis throughout the world, and specified provisional aggregate power flux-density (“pfd”) limits for use of that band.⁴⁹

23. In letters to the Commission of July 2001 and August 2002, NTIA requested that the Commission not propose the domestic adoption of international footnote 5.328A because of the U.S. Government’s plans to use only the band 1164-1189 MHz for L5 and because uses for the remainder of the RNSS allocation had not been defined, nor had technical compatibility studies been performed.⁵⁰ NTIA therefore requested that consideration of the band 1189-1215 MHz be deferred,⁵¹ but stated that it and Federal agencies were investigating the possibility of using the entire band 1164-1215 MHz.⁵²

⁴⁶ Each GPS satellite takes 12 hours to orbit the Earth. These satellites are equipped with accurate clocks so that they can broadcast signals with a precise time message. The GPS receiver uses the time signals from multiple satellites to determine precise latitude, longitude, and altitude.

⁴⁷ The International Civil Aviation Organization has designated the L1 links of GPS and the Russian GLONASS system as the principal elements of the Global Navigation Satellite System (“GNSS”). The GPS L1 SPS ranging signal is a 2.046 megahertz signal centered at 1575.42 MHz. The Wide Area Augmentation System (“WAAS”), when it becomes operational, will utilize the same band and carrier frequency as GPS L1.

⁴⁸ The GPS L2 link shares the band 1215-1240 MHz with radiolocation services, such as military radars. The 1240-1260 MHz band is shared by GLONASS L2 and the nationwide joint surveillance system radar network operated by the Federal Aviation Administration and the Department of Defense. The GPS L2 carrier frequency is 1227.60 MHz. Although the L2 frequency is currently not part of SPS, the U.S. Government has decided to add a second non-safety-of-life coded signal at the GPS L2 frequency on satellites scheduled for launch beginning in 2005.

⁴⁹ See 47 C.F.R. § 2.106, footnote 5.328A.

⁵⁰ See Letter from Associate Administrator, Office of Spectrum Management, NTIA, to Acting Chief, Office of Engineering and Technology (“OET”), FCC, dated July 18, 2001 (“July 2001 NTIA Letter”); and Letter from Acting Associate Administrator, Office of Spectrum Management, NTIA to Chief, OET, FCC, dated August 8, 2002 (“NTIA RNSS Letter”). In the NTIA RNSS Letter, NTIA revised its request for the L5 bandwidth from 24 megahertz to 25 megahertz (from the 1164-1188 MHz band to the 1164-1189 MHz band).

⁵¹ See July 2001 NTIA Letter at Attachment 1.

⁵² See NTIA RNSS Letter.

24. In its September 2001 Petition for Rule Making, Lockheed Martin requested that the entire 1164-1215 MHz band be implemented domestically for RNSS, stating that it may be more expedient for the Commission to specify the entire band, rather than just the portion of the band that the U.S. Government currently requires.⁵³ Lockheed Martin also requested that the RNSS allocation in the band 1164-1215 MHz be added to both sections 2.106 and 25.202(a) of the Commission's Rules, and that this allocation be made available to both Federal Government and non-Federal Government users;⁵⁴ that the RNSS allocation in the band 1559-1610 MHz be added to section 25.202(a) of the Commission's Rules;⁵⁵ and that the Commission permit the 1164-1215 MHz L5, the 1215-1240 MHz L2, and the 1559-1610 MHz L1 bands to be used for space-to-space transmissions.⁵⁶

25. *Proposals.* As requested by NTIA, the Commission proposed in the *Notice* to adopt new footnote US385, which would allocate the band 1164-1189 MHz for RNSS downlink and space-to-space transmissions on a primary basis. It also proposed to add definitions of Differential Radionavigation Satellite Service ("Differential RNSS") Station and Differential Global Positioning System ("DGPS") Station to Part 2 of the Commission's Rules, as follows:

Differential Radionavigation Satellite Service (Differential RNSS) Station. A station used for the transmission of differential correction data and related information (such as ionospheric data and RNSS satellite integrity information) as an augmentation to an RNSS system for the purpose of improved navigation accuracy.

Differential Global Positioning System (DGPS) Station. A differential RNSS station for specific augmentation of GPS.⁵⁷

26. Additionally, the Commission requested comment on whether the band 1164-1189 MHz should be added to a new footnote US343 that was proposed in WT Docket No. 01-289.⁵⁸ This footnote would provide that DGPS stations may be authorized on a primary basis in the bands 108-117.975 MHz and 1559-1610 MHz for the specific purpose of transmitting DGPS information intended for aircraft navigation. The Commission further sought comment on whether it should allocate domestically the international RNSS allocation at 1189-1215 MHz, and in particular on whether this allocation is needed to support U.S. requirements. In the *Notice*, the Commission observed that studies continue in the international process to determine the aggregate impact of multiple RNSS systems on incumbent aeronautical radionavigation service ("ARNS") systems and that, given the safety-of-life aspects of these ARNS systems, the Commission did not anticipate adopting this additional allocation unless a need is demonstrated and studies are done that support such a move.⁵⁹

27. The *Notice* also proposed to add a space-to-space directional indicator to the primary RNSS allocation in the bands 1215-1240 MHz and 1559-1610 MHz, which are currently limited to

⁵³ See Lockheed Martin Petition for Rule Making, *supra* n.11, at 11-12.

⁵⁴ *Id.* at 13. Section 2.106 is the U.S. Table of Frequency Allocations and section 25.202(a) lists frequencies available for various satellite services.

⁵⁵ *Id.* at Attachment 2.

⁵⁶ *Id.* at 6, 14, and 17.

⁵⁷ *Notice* at 19769.

⁵⁸ See *Review of Part 87 of the Commission's Rules Concerning the Aviation Radio Service*, WT Docket No. 01-289, *Notice of Proposed Rule Making*, 16 FCC Red 19005 (2001).

⁵⁹ *Notice* at 19770.

downlink transmissions, to recognize current and future use of spaceborne RNSS receivers for scientific and commercial applications. Finally, the *Notice* declined to propose adding the RNSS L1 and L5 frequencies to section 25.202(a) of the Commission's Rules, as requested by the Lockheed Martin petition for rule making.⁶⁰

28. *Comments.* Boeing and Lockheed Martin argue that the entire 1164-1215 MHz band should be allocated for the RNSS domestically, and NTIA voices conditional support for such an allocation. Boeing states that this increased allocation would facilitate spectrum sharing between multiple RNSS systems and be consistent with the principle that the Commission should, whenever possible, align the U.S. Table with international allocations.⁶¹ Boeing acknowledges that this band is already allocated in the United States for the ARNS, but maintains that the 2003 World Radiocommunication Conference ("WRC-03") power limits that the U.S. is proposing for RNSS operations in the band will adequately protect ARNS operations.⁶² Boeing therefore recommends that, consistent with this power limit proposal to WRC-03, the Commission adopt a coordination requirement for RNSS networks in the band 1164-1215 MHz that ensures that the aggregate equivalent power flux density ("epfd") from all RNSS systems does not exceed -121.5 dBW/m²/MHz.⁶³

29. Lockheed Martin contends that while a U.S. RNSS licensee would be expected to limit its operations to the band 1164-1189 MHz, there are other RNSS systems that may seek to use spectrum above 1189 MHz. Lockheed Martin has pending with the Commission an application to provide RNSS and differential GPS in the L1 and L5 frequencies.⁶⁴ Lockheed Martin therefore recommends that the Commission not act in the instant proceeding in a manner that would be perceived internationally as an attempt to exclude that upper spectrum's availability in North America.⁶⁵ Lockheed Martin also contends that circumstances have changed significantly since NTIA's July 2001 request to defer consideration of GPS L5 use in the band 1189-1215 MHz. Specifically, Lockheed Martin contends that ITU-R studies show that multiple RNSS systems operating across the entire 1164-1215 MHz band would not have an adverse impact on existing ARNS systems, provided that the epfd level produced by all space stations of all RNSS systems does not exceed -121.5 dBW/m²/MHz in any one megahertz band. Lockheed Martin submits that a decision to adopt domestically the entire WRC-2000 allocation to RNSS at 1164-1215 MHz would not prejudice or otherwise prejudice the ability of the Commission to deny RNSS systems access to the band 1189-1215 MHz should there be valid technical reasons for doing so.⁶⁶

30. Lockheed Martin also opposes adoption of the proposed footnote US385, supports use of the bands 1164-1215 MHz and 1559-1610 MHz for space-to-space transmissions, supports expanding the

⁶⁰ *Id.*

⁶¹ Boeing's application to provide a Navigation Augmentation Service for aircraft using GPS satellite radionavigation in the GPS L2 band was dismissed as incomplete. See *The Boeing Company*, DA 03-2073 (released June 24, 2003).

⁶² Boeing Comments at iii.

⁶³ *Id.* at 10-11.

⁶⁴ See Lockheed Martin Corporation, Application for Authority to Launch and Operate a Global System of Geostationary Orbit Satellites in the Radionavigation Satellite Service, File Nos. SAT-LOA-19990427-00045/00046/00047/00048/00049/00050, filed April 27, 1999. In its Application, Lockheed Martin also requested the L2 frequencies, but on July 30, 2003, it filed an Amendment to its application, in which it withdrew that request and reaffirmed its request for the L1 and L5 frequencies.

⁶⁵ Lockheed Martin Comments at 8.

⁶⁶ *Id.* at 10-12.

current GPS L2 spectrum at 1215-1240 MHz to 1215-1300 MHz, and supports removing the Federal Government restriction from the L2 spectrum. It also supports adding the international RNSS allocations at 1164-1215 MHz and 1559-1610 MHz to the Part 25 list of frequency bands available for satellite services. With respect to footnote US385, Lockheed Martin asserts that the obligation in that footnote requiring RNSS systems to neither cause harmful interference to, nor claim protection from, ARNS systems may be perceived as creating an additional or inconsistent obligation on RNSS systems, which must comply with technical determinations made in international fora.⁶⁷ With respect to use of the bands 1164-1215 MHz and 1559-1610 MHz for space-to-space transmissions, Lockheed Martin notes that WRC-2000 made this spectrum available for such transmissions, and that these additions will provide greater accuracy and integrity for the Global Navigation Satellite System.⁶⁸ With respect to expanding the current GPS L2 spectrum at 1215-1240 MHz to 1215-1300 MHz, Lockheed Martin states that WRC-2000 expanded the L2 allocation to 1215-1300 MHz and that operational experience demonstrates that co-primary sharing between RNSS and radars in the expanded band can be accomplished without harmful interference. Lockheed Martin argues that failure to expand the band will lead to anticompetitive concerns internationally. With respect to removing the Federal Government restriction from the L2 spectrum, Lockheed Martin maintains that in 1998 the U.S. Government announced that a second civil signal would be added to GPS in the L2 band. Accordingly, Lockheed Martin recommends that the Federal Government-only restriction be removed from this band.⁶⁹ Finally, with respect to adding the international RNSS allocations at 1164-1215 MHz and 1559-1610 MHz to the Part 25 list of frequency bands available for satellite services, Lockheed Martin acknowledges that it would not be inconsistent with precedent for the Commission to defer consideration of additional RNSS bands to a separate service rules proceeding, but recommends that if the Commission takes that approach it ensure it not delay the authorization of RNSS systems for which applications are pending.⁷⁰

31. NTIA states that it recommends an RNSS allocation in the 1164-1215 MHz band, but notes that the Federal Aviation Administration (“FAA”) has not yet conducted an analysis for the 1189-1215 MHz band and does not know what would be required to accommodate RNSS in that band. Specifically, FAA expresses concern that there may be stations in the aeronautical radionavigation service in the 1189-1215 MHz band that would have to be retuned as a result of RNSS use of that band, and states that an analysis needs to be performed regarding the sufficiency of spectrum for such retuning. NTIA states that the FAA is planning to conduct studies in 2004 regarding RNSS use of the 1189-1215 MHz band, but that the FAA will require detailed technical information, including receiver performance criteria, from RNSS proponents. NTIA further states that the FAA believes that, until its studies are complete and show that RNSS operations in the 1189-1215 MHz band are viable, RNSS should not be licensed in that band. NTIA therefore recommends that the Commission add a footnote to the 960-1215 MHz band in the U.S. Table, which would read as follows:

The band 1164-1215 MHz is also allocated to the radionavigation-satellite-service (space-to-Earth, space-to-space) on a primary basis. In this band, stations in the radionavigation-satellite-service shall not cause harmful interference to, nor claim protection from, stations of the aeronautical radionavigation service.⁷¹

⁶⁷ *Id.* at 12-13.

⁶⁸ *Id.* at 13-14.

⁶⁹ *Id.* at 14-15.

⁷⁰ *Id.* at 15-16. *See also* Lockheed Martin Petition for Rule Making, *supra* n.11, at Attachment 2.

⁷¹ *See* Letter from Acting Associate Administrator, Office of Spectrum Management, NTIA to Chief, OET, FCC, dated September 12, 2003.

32. Inmarsat supports the proposed RNSS allocation in the band 1164-1189 MHz, but opposes adoption of proposed footnote US385, contending that it would cause confusion and is unnecessary. Inmarsat argues that footnote 5.328A provides for an aggregate pfd limit, which defines the power level to which the ARNS shall be protected, and that any additional requirement to not cause harmful interference to the ARNS is superfluous and possibly contradictory to the specific power limits that are designed to achieve this same goal.⁷² Inmarsat also argues that the proposed definitions of Differential RNSS and DGPS stations create ambiguity and confusion. Inmarsat states that its space stations meet the proposed definitions, while also meeting the definition of a space station in RNSS; and that its land earth stations meet the proposed definitions, while also meeting the definition of an earth station in the FSS. Inmarsat contends that the existing rules that apply to RNSS space stations and FSS earth stations are satisfactory and that there does not appear to be any justification for applying different rules to these station types.⁷³ Finally, Inmarsat states that it intends to provide space capacity for GPS augmentation service with a signal in the band 1164-1189 MHz, and that it does not see the need for making special provisions for RNSS systems that are used for augmentation purposes. However, Inmarsat recommends that, if the Commission adds that band to the proposed footnote US343, the proposed amendment to the footnote should apply to Inmarsat satellites.⁷⁴

33. *Decision.* Since adoption of the *Notice* in this docket, WRC-03 has taken certain decisions regarding RNSS that are relevant to issues raised in this proceeding. In particular, as noted by NTIA, WRC-03 has modified footnote 5.328A of the international Table of Allocations to clarify that all stations in the RNSS operating in the band 1164-1215 MHz shall operate in accordance with specified aggregate interference protection criteria for ARNS (-121.5 dB(W/m²) in any 1 MHz band) and not claim protection from stations in the ARNS operating in the 960-1215 MHz band.⁷⁵ Administrations operating RNSS stations in these bands are to cooperate to ensure that the protection criteria are satisfied. In the *Notice* in this proceeding, we proposed to add a primary RNSS allocation in the band 1164-1189 MHz, and sought comment on whether we should extend the allocation to the band 1189-1215 MHz, noting in regard to the latter band that studies were underway in the international process to determine the aggregate impacts of multiple RNSS systems on incumbent ARNS systems. We stated that we would not anticipate adopting this additional allocation unless a need was demonstrated and studies completed.⁷⁶ Although we did not propose pfd limits on RNSS systems, we did propose to adopt a new United States footnote (USyyy) that would require RNSS stations to not cause interference to, nor claim protection from, stations in the ARNS.⁷⁷ Given the WRC-03 results and support on the record in this proceeding, we conclude that the RNSS allocation should extend from 1164-1215 MHz. This increased allocation will provide flexibility for potential future GPS implementation plans and facilitate cooperative efforts among administrations operating RNSS systems in these bands to protect ARNS systems. However, we concur with NTIA that a footnote – rather than a table – allocation for the new 1164-1215 MHz RNSS band is appropriate, and that this footnote should include language specifying that RNSS shall not cause harmful

⁷² Inmarsat Comments at 7.

⁷³ *Id.* at 8.

⁷⁴ *Id.*

⁷⁵ See *WRC-03 Provisional Final Acts* at 14, 71, and 484. This footnote modification became effective July 5, 2003, and applies to a RNSS system for which complete coordination or notification information was received by the ITU after June 2, 2000. *Id.* at 71. Pursuant to new footnote 5.BA02, no constraints in addition to those in place prior to WRC-2000 will be placed on RNSS use in the band 1215-1260 MHz brought into use before June 2, 2000. *Id.* at 13 and 499.

⁷⁶ See *Notice* at ¶ 41.

⁷⁷ *Id.* at ¶ 37 and Appendix.

interference to ARNS. While Inmarsat contends that this language could be construed as an additional requirement or superfluous to the WRC-03 aggregate interference protection criteria, we find it appropriate as an interim measure. We intend to address how best to reference the WRC-03 protection criteria for ARNS, whether by adopting international footnote 5.328A or modifying our Part 25 satellite service rules, when we initiate a proceeding to address WRC-03 implementation.⁷⁸

34. With regard to Lockheed Martin's recommendations that we expand the current GPS L2 spectrum at 1215-1240 MHz to 1215-1300 MHz and permit non-Federal Government RNSS use of the band 1215-1300 MHz, we observe that the *Notice* did not propose either of those changes and thus we decline to consider these changes at this time. With regard to Lockheed Martin's recommendation that we add the international RNSS allocations at 1164-1215 MHz and 1559-1610 MHz to the Part 25 list of frequency bands available for satellite services, we see no advantage to be gained by taking that action now. As the Commission stated in the *Notice*, such action would be more appropriate in connection with development of service and licensing rules for the RNSS frequency bands, and following development of international technical criteria for operations in these bands.⁷⁹ We will explore all of these issues when we consider the WRC-03 protection criteria for ARNS in the WRC-03 implementation proceeding reference in the preceding paragraph.

35. With regard to Inmarsat's recommendation that we not adopt the proposed definitions of Differential RNSS and DGPS stations, we disagree with Inmarsat that these definitions create ambiguity or confusion between them and any current definition in either our rules or in the ITU rules. The definitions are simply informational. As we observed in the *Notice*, differential RNSS correction data and related information is transmitted in a data link and sometimes is not within the RNSS. These definitions clarify that this information augments the RNSS system and improves navigation accuracy. Accordingly, we are adding the proposed definitions of Differential RNSS and DGPS stations to Part 2 of our Rules.

36. Finally, with regard to Inmarsat's comments on whether the band 1164-1189 MHz should be added to proposed footnote US343, we note that this footnote was proposed in the *Notice of Proposed Rule Making* in WT Docket No. 01-289,⁸⁰ which is still pending before us. We do not wish herein to prejudge whether proposed US343 will be adopted in that proceeding; hence, we will defer consideration of the possible addition of the band 1164-1189 MHz to proposed US343 to the *Report and Order* in WT Docket No. 01-289.

C. Satellite DARS and Adjacent Bands.

37. *Background.* The band 2320-2345 MHz is allocated to the broadcasting-satellite service (sound) and complementary terrestrial broadcasting service on a primary basis. This service is generally known as Satellite DARS. The Satellite DARS band is also allocated on a secondary basis to the mobile service for non-Federal Government use and to the fixed, mobile, and radiolocation services for Federal Government use.⁸¹ Footnote US276 states that the mobile allocation is limited to aeronautical telemetry

⁷⁸ This proceeding will also address modifying the 1164-1215 MHz RNSS allocation from a table footnote to a direct table allocation in accordance with the Final Acts adopted at WRC-03.

⁷⁹ *Notice* at 19770.

⁸⁰ See *Review of Part 87 of the Commission's Rules Concerning the Aviation Radio Service*, WT Docket No. 01-289, *Notice of Proposed Rule Making*, 16 FCC Rcd 19005 (2001).

⁸¹ Footnote US 328 states that the mobile and radiolocation services are allocated on a primary basis until Satellite DARS has been brought into use. In addition, that footnote states that Satellite DARS during implementation should minimize its impact on the expendable and reusable launch vehicle frequency 2332.5 MHz to the extent possible. See 47 C.F.R. § 2.106, footnote US328.

and associated telecommand operations (“flight testing”).⁸² Flight test use of the Satellite DARS band remains permissible for the Aviation Services.⁸³ The bands 2310-2320 MHz and 2345-2360 MHz are allocated to the fixed, mobile, radiolocation, and broadcasting-satellite service (sound) and complementary terrestrial broadcasting services on a co-primary basis for non-Federal Government use.

38. *Proposals.* In the *Notice*, the Commission proposed to revise footnote US328 to permit flight testing operations to continue on a secondary basis in the band 2320-2345 MHz. The Commission also proposed to delete the radiolocation service from footnote US328 because there are no non-Federal Government radiolocation operations in the Satellite DARS band and because the Federal Government already has a secondary direct Table allocation for this service.⁸⁴ It further proposed to delete the requirement that Satellite DARS licensees take cognizance of the launch vehicle frequency 2332.5 MHz because satellite DARS systems have been implemented.⁸⁵ In addition, the Commission requested comment on whether all secondary operations should be deleted from this band in order to protect Satellite DARS operations.⁸⁶ It proposed to amend section 87.303(d)(1) to state that frequencies in the band 2310-2360 MHz may be assigned on a secondary basis for telemetry and telecommand operations associated with the flight testing of manned or unmanned aircraft and missiles, or their major component, and proposed to delete the launch vehicle frequency 2332.5 MHz from section 87.303(d)(1). The Commission also proposed to add cross-references in the U.S. Table to Part 25, Satellite Communications, in the band 2320-2345 MHz, and to Part 87, Aviation Services, in the band 2310-2390 MHz. Finally, the *Notice* proposed to delete footnote 5.396 from the band 2310-2360 MHz from the Federal Government Table because that footnote pertains to the broadcasting-satellite service, which is not regulated by NTIA; and to delete footnote US338 from the band 2310-2320 MHz because that footnote does not pertain to that band.⁸⁷ These combined actions were designed to clarify use of the band 2310-2390 MHz and to permit the new satellite DARS service to operate in an interference-free environment in the band 2320-2345 MHz.

39. *Comments.* Only AFTRCC and Boeing commented on the proposals in the *Notice* pertaining to the band 2310-2390 MHz set forth in the *Notice*. AFTRCC states that there is a potential for interference between aeronautical telemetry and Satellite DARS operations in the band 2320-2345 MHz, and that any interference to flight test operations poses a risk to safety of life and property. Accordingly, AFTRCC argues, aeronautical telemetry users will not use the band 2320-2345 MHz on a secondary basis, and so it is appropriate to delete the aeronautical telemetry allocation from that band.⁸⁸ Boeing states that, despite its heavy use of flight test spectrum, the Commission should eliminate the secondary aeronautical telemetry allocation in that band because it is now unusable for flight test operations due to Satellite DARS operations.⁸⁹

⁸² See 47 C.F.R. § 2.106, footnote US276.

⁸³ See 47 C.F.R. § 87.303(d)(1).

⁸⁴ *Notice* at 19771.

⁸⁵ *Id.* at 19771-72.

⁸⁶ *Id.* at 19772.

⁸⁷ *Id.*

⁸⁸ AFTRCC Comments at 3.

⁸⁹ Boeing Comments at 6-7.

40. *Decision.* We are adopting the proposals pertaining to the band 2310-2390 MHz set forth in the *Notice*, except that we are deleting the mobile service allocation from band 2320-2345 MHz in the U.S. Table and are deleting footnotes US276 and US328, which limit uses under the mobile allocation, from that band. AFTRCC's and Boeing's comments convince us that there is no need to maintain a secondary aeronautical telemetry allocation in the band 2320-2345 MHz because such an allocation would be unusable due to potential interference from new Satellite DARS operations. Because footnote US276 currently limits the use of the mobile service in the band 2320-2385 MHz to aeronautical telemetry, this United States footnote is retained but henceforth will apply only to the band 2360-2385 MHz. In contrast, footnote US328, which applies only to the band 2320-2345 MHz, is deleted in its entirety. In all other respects, we adopt the proposals for the band 2310-2390 MHz set forth in the *Notice*, as shown in Appendix B. This action will eliminate possible interference to Satellite DARS operations, as well as remove confusion regarding use of the band 2310-2390 MHz.

D. ITFS/MDS Band

41. *Background.* In the United States, the band 2500-2690 MHz is allocated to the fixed, mobile except aeronautical mobile, BSS, and FSS services on a co-primary basis for non-Federal Government use.⁹⁰ The band 2500-2690 MHz is currently used exclusively for fixed purposes by the Instructional Television Fixed Service ("ITFS") and the Multipoint Distribution Service ("MDS").⁹¹ As an adjunct to the original ITFS use, the BSS allocation is limited by footnote NG101 to "community reception" of educational TV programming and public service information.⁹² Similarly, the FSS allocation is limited by footnote NG102 to educational FSS use throughout the United States, except that the FSS allocation may be also used for common carrier purposes in Alaska, Hawaii, and certain Pacific islands. In order to preserve spectrum for FSS use in Alaska, footnote NG47 states that the band 2655-2690 MHz is not available for use by terrestrial services. These limited BSS and FSS allocations are unused in the United States.⁹³

42. WRC-2000 identified the band 2500-2690 MHz for use by third generation wireless systems ("3G"). In order to provide the ITFS and MDS licensees in this band with additional flexibility, the Commission recently allocated the band 2500-2690 MHz to the mobile, except aeronautical mobile, service as reflected above.⁹⁴ No mobile service rules have been established to this point; however, a

⁹⁰ An allocation to the mobile except aeronautical mobile service means that land mobile and maritime mobile services may be provided, but that aeronautical mobile services are prohibited.

⁹¹ The MDS channels that use the band 2596-2644 MHz are known as the Multichannel Multipoint Distribution Service. See 47 C.F.R. § 21.2.

⁹² Community reception in the broadcasting-satellite service is the reception of emissions from a BSS space station by receiving equipment, which in some cases may be complex and have antenna larger than those used for individual reception, and intended for use (1) by a group of the general public at one location; or (2) through a distribution system covering a limited area. See 47 C.F.R. § 2.1. The community reception concept appears to have been overtaken by individual reception of BSS programming, such as that offered by DirecTV and the DISH Network.

⁹³ We observe that Canada has filed a coordination request for a seven BSS GSO satellite system with the ITU that would, if approved, provide television and other services to passengers on aircraft using the band 2535-2655 MHz. In addition, because the band 2500-2690 MHz was identified at WRC-2000 as an additional band for IMT-2000 systems, WRC-03 agenda item 1.34 reviewed the threshold values for BSS (sound) systems using NGSO satellites in the sub-band 2630-2655 MHz. The outcome of this review was that footnote 5.416 was modified and footnotes 5.418Bbis and 5.418Cbis were added to the International Table of Allocations in all three regions; see *WRC-03 Provisional Final Acts* at 22-25. These footnote changes do not affect our decision herein.

⁹⁴ See *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless*

rulemaking proceeding to establish such rules was recently initiated.⁹⁵ In the *New Advanced Wireless Services First R&O and MO&O*, the Commission found that sharing between terrestrial systems and MSS downlinks in the band 2500-2520 MHz and MSS uplinks in the band 2670-2690 MHz would not be feasible.⁹⁶

43. *Proposals.* In the *Notice*, the Commission stated its belief that FSS and BSS operations in the band 2500-2690 MHz could affect the reliability of point-to-multipoint channels and low-power consumer response channels in that band and noted that service rules for advanced mobile operations may also be implemented in that band in the future. Therefore, the Commission proposed to delete the unused and limited FSS and BSS allocations from the band 2500-2690 MHz in order to remove regulatory uncertainty. Consistent with its proposal to delete these allocations, the Commission also proposed to delete footnotes NG101 and NG102, which limit the use of the allocations. In addition, it proposed to delete footnote NG47 so as to make the band 2655-2690 MHz available for ITFS/MDS use in Alaska.⁹⁷

44. *Comments.* AirTV Limited (“AirTV”) states that it has developed and plans to implement a unique satellite-based Direct-to-Aircraft (“DTA”) entertainment and e-mail system in the band 2535-2670 MHz that will operate in conformity with the 2520-2670 MHz BSS allocation. Accordingly, AirTV opposes deleting that allocation. AirTV also supports deleting footnote NG101 to allow a broader range of programming to commercial airline passengers.⁹⁸ Additionally, AirTV claims that currently there is no satellite system or other infrastructure that can provide the capacity and coverage needed to deliver the services that it plans, and that if the 2500-2600 MHz BSS allocation were to be deleted, AirTV would be able to provide service everywhere in the world except the United States. AirTV argues that such a situation would create a protectionist and anti-competitive market for its commercial airline services, which would be counter to the World Trade Organization (“WTO”) agreement that encourages international competition.⁹⁹

45. Boeing and the Wireless Communications Association International, Inc. (“WCA”) support deleting the 2500-2690 MHz BSS allocation. Boeing argues that AirTV is incorrect in arguing that deleting that allocation would harm competition for broadband satellite services to aircraft. Boeing maintains that its satellite-based “Connexion” service, can make broadband data and entertainment services available to airline passengers and crews globally,¹⁰⁰ and that other companies have also proposed to provide broadband satellite services to aircraft in the United States.¹⁰¹ Boeing also argues

Services, ET Docket No. 00-258, *First Report and Order and Memorandum Opinion and Order*, 16 FCC Rcd 17222 (2001) (“*New Advanced Wireless Services First R&O and MO&O*”).

⁹⁵ See *Amendment of Parts 1, 21, 73, 74, and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, WT Docket No. 03-66, RM-10586, *Notice of Proposed Rule Making and Memorandum Opinion and Order*, 18 FCC Rcd 6722 (2003).

⁹⁶ *New Advanced Wireless Services First R&O and MO&O* at ¶ 12.

⁹⁷ *Notice* at 19773.

⁹⁸ AirTV Comments at 1-2.

⁹⁹ *Id.* at 9-10.

¹⁰⁰ Boeing’s Connexion service uses a fleet of mobile earth stations operating in the AMSS in the Ku-band (12/14 GHz band range). See Boeing Reply Comments at 3.

¹⁰¹ JetBlue Airways provides its passengers with up to 24 channels of DirecTV television programming as part of its in-flight entertainment, and Tenzing offers airlines an in-flight e-mail capability, employing satellite and terrestrial communications with an onboard local area network. The latter service is currently available on select flights on

that the WTO protocol does not apply to satellite transmission of direct-to-home and direct broadcast satellite services in the United States, and that the U.S. has the right to limit the issuance of new satellite authorizations when faced with insufficient spectrum availability. Accordingly, Boeing contends that, at least from the standpoint of competition analysis, the *Notice's* proposal to delete the 2500-2690 MHz BSS allocation is justified by the public interest and is fully consistent with international requirements.¹⁰²

46. WCA contends that AirTV is asking not only to preserve the 2500-2690 MHz BSS allocation, but to expand the nature of the services that can be provided under that allocation. WCA maintains that AirTV's support for deleting footnote NG101 is not a logical outgrowth of the proposal set forth in the *Notice*, which was to eliminate BSS operations in the band 2500-2690 MHz.¹⁰³ WCA also claims that AirTV's DTA system could cause interference to MDS/ITFS operations in that band, and that AirTV has not met the burden of demonstrating that its service will not cause interference to those operations. Finally, WCA contends that AirTV's proposed service can be provided by other satellite services that do not jeopardize the provision of MDS/ITFS.¹⁰⁴

47. *Decision.* We are adopting the proposals pertaining to the band 2500-2690 MHz set forth in the *Notice*. No party objects to the proposal to delete the FSS allocation in that band, and only AirTV objects to the proposal to delete the BSS allocation in that band. We make no finding on the potential benefits of AirTV's proposed DTA system. However, we find that such a system would increase costs for terrestrial services due to the need to mitigate interference caused by AirTV's system. We concur with Boeing that the WTO agreement does not apply to AirTV's system and thus the U.S. may limit new satellite authorizations when faced with potential interference issues with incumbent operations. We concur with WCA that AirTV has not met the burden of demonstrating that its system will not cause interference to terrestrial services that use the band 2520-2670 MHz. Accordingly, as proposed in the *Notice* and as shown in Appendix B, we are deleting the FSS and BSS allocations from the band 2500-2690 MHz and are deleting footnotes NG47, NG101, and NG102.

E. Space Science Services

48. *Background.* The space science services include the EESS, SRS, METSAT, and space operation services. These services are used to measure phenomena that can impact the Earth's habitat and its environmental quality, to provide weather forecasts, and to explore the planets. Active and passive spaceborne microwave sensors are tools that provide environmental data on a repetitive and global scale with an ability to penetrate clouds to obtain measurements unavailable by other means. In addition to using spectrum for active and passive sensing from space, the space science services use spectrum for command, tracking, data acquisition, and communications with satellites.

49. *Proposals.* With respect to active spaceborne sensors, in the *Notice* the Commission proposed, in response to a request from NTIA, to allocate the bands 1215-1300 MHz, 3100-3300 MHz, 5255-5350 MHz, 8550-8650 MHz, 9500-9800 MHz, 13.25-13.4 GHz, 17.2-17.3 GHz, and 35.5-36 GHz to the EESS (active) and SRS (active); the bands 5250-5255 MHz and 13.4-13.75 GHz to the EESS (active) and SRS; and the band 5350-5460 MHz to the EESS (active). These allocation changes would implement WRC-97 allocation changes for the space science services. For the Federal Government

Cathay Pacific Airlines and on United Airlines' domestic flights. See, respectively, <http://www.aviationtoday.com/reports/avionics/previous/0600/06scan.htm>; <http://www.tenzing.com>; and <http://www.ual.com/press/detail/0.1442.51106.00.html>

¹⁰² Boeing Reply Comments at 2-5.

¹⁰³ WCA Reply Comments at 3-4.

¹⁰⁴ *Id.* at 4-6.

Table, the Commission proposed that all of these active spaceborne sensor allocations have primary status, except in the band 3100-3300 MHz, where the sensors would continue to have secondary status. For the non-Federal Government Table, the Commission proposed that all of these allocations have secondary status. At the request of NTIA, the Commission also proposed to add five international footnotes to the U.S. Table to ensure that active spaceborne sensors not cause harmful interference to, nor constrain the use and development of, incumbent primary services in the bands 1215-1300 MHz, 5350-5460 MHz, and 13.25-13.75 GHz. Finally, and also at the request of NTIA, the Commission proposed to add two international footnotes to the U.S. Table to ensure that primary SRS allocations in the bands 5250-5255 MHz and 13.4-13.75 GHz are limited to active spaceborne sensors and that other space research users are on a secondary basis. Consistent with these proposals, the Commission proposed to delete from the U.S. Table international footnotes 5.333 and 5.551, which provide the current secondary active spaceborne sensor allocations, and also proposed to delete the secondary allocation for the SRS (Earth-to-space) in the band 13.25-13.4 GHz.¹⁰⁵

50. With respect to other space science services, in the band 401-403 MHz the Commission proposed in the *Notice*, in response to a request from NTIA, to upgrade the secondary EESS and METSAT allocations to primary status for Federal Government use and to limit non-Federal Government use of these allocations to earth stations transmitting to Federal Government space stations. The Commission requested comment on whether non-Federal Government use of these allocations should be limited to earth stations transmitting to Federal Government space stations. The Commission proposed to allocate the band 410-420 MHz to the SRS (space-to-space) on a primary basis for Federal Government use and to limit its use, through the application of footnote 5.268, to permit communications among astronauts and their base spacecraft while those astronauts are performing activities outside the base spacecraft.¹⁰⁶ In the band 7750-7850 MHz, the Commission proposed an allocation for Federal Government METSAT downlink use, limited to NGSO satellites, as requested by NTIA.¹⁰⁷ In the band 8400-8450 MHz, the Commission proposed an allocation for Deep Space downlinks on a secondary basis, to permit non-Federal Government entities, such as educational institutions, to perform scientific research in cooperation with the National Aeronautics and Space Administration (“NASA”).¹⁰⁸ In the 32 GHz band range, the Commission proposed to delete the unused ISS allocation from the band 32-32.3 GHz in order to protect deep space reception at Goldstone, California, and proposed to move the text of an international footnote into a U.S. footnote to reflect the anticipated prohibition on use of the band 32-32.3 GHz by the ISS.¹⁰⁹ Finally, in the 34 GHz frequency range, the Commission proposed to move the SRS (deep space) (Earth-to-space) allocation at 34.2-34.7 GHz from a U.S. footnote into the U.S. Table as a direct Table allocation, with Federal Government use on a primary basis and with non-Federal Government use on a secondary basis; and proposed to move the Goldstone site restriction in that same band from footnote US252 to US262.¹¹⁰

51. *Comments.* Only Lockheed Martin and Medtronic, Inc. (“Medtronic”) commented on any of the proposals in the *Notice* relating to the space science services. Lockheed Martin disagrees with the proposal to permit additional primary Federal Government use of the band 1215-1300 MHz. Lockheed Martin argues that primary Federal Government EESS and SRS active sensor operations would

¹⁰⁵ *Notice* at 19778-79.

¹⁰⁶ *Id.* at 19781-19782.

¹⁰⁷ *Id.* at 19782-83.

¹⁰⁸ *Id.* at 19783.

¹⁰⁹ *Id.* at 19784.

¹¹⁰ *Id.* at 19785.

pose a threat of harmful interference to domestic RNSS operations in the band 1215-1240 MHz and to additional global RNSS operations in the band 1240-1300 MHz, and that RNSS operations could also compromise active sensor operations. Accordingly, Lockheed Martin recommends that primary active sensor operations in the band 1215-1300 MHz not be permitted without further study.¹¹¹ Medtronic supports limiting non-Federal Government use of the EESS and METSAT allocations in the band 401-403 MHz to earth stations transmitting to Federal Government space stations. Medtronic contends that there has been no showing of need for a non-Federal Government service to communicate to non-Federal Government space stations in that band, and that such operations could cause interference to Medtronic's Medical Implant Communications Service ("MICS") that operates on a secondary basis in the sub-band 402-403 MHz. Therefore, Medtronic states that transmissions to non-Federal Government space stations in that band should not be permitted until such time as proposed operational parameters for power, location, number of stations, and other relevant facts are made available that allow for an analysis of the spectrum sharing capabilities between those operations and MICS operations.¹¹²

52. *Decision.* We are adopting the proposals to provide a primary Federal Government allocation and a secondary non-Federal Government allocation for EESS (active) and SRS (active) in the band 1215-1300 MHz, as shown in Appendix B. With regard to Lockheed Martin's concerns that a primary allocation for EESS (active) and SRS (active) would pose a threat of harmful interference to domestic and global RNSS, we disagree. First, we are adding international footnote 5.332, which states that, for the band 1215-1260 MHz, active spaceborne sensors in the EESS and SRS shall not cause harmful interference to, claim protection from, or otherwise impose constraints on operation or development of the radiolocation service, the RNSS and other services allocated on a primary basis. Second, we observe that the international frequency table already contains primary allocations for RNSS, EESS (active) and SRS (active) in the band 1215-1300 MHz. Thus, if the U.S., in the future, decides to add a primary RNSS allocation to the 1240-1300 MHz band, such a decision would be consistent with the existing international allocation. Any appropriate sharing criteria can be worked out at that time. With regard to Medtronic's recommendation that non-Federal Government use of the EESS and METSAT allocations in the band 401-403 MHz be limited to earth stations transmitting to Federal Government space stations, no party supports permitting earth stations to transmit to non-Federal Government space stations in this band and we did not propose such use. Accordingly, we decline to permit that use.

F. The Band 25.25-27.5 GHz

53. *Background.* In the United States, the band 25.25-27.5 GHz is used primarily by the Federal Government. Specifically, in the Federal Government Table, the band 25.25-27.5 GHz is allocated to the fixed and mobile services on a co-primary basis and to the EESS (space-to-space) on a secondary basis, and the sub-band 25.25-27 GHz is allocated to the standard frequency and time signal-satellite service (Earth-to-space) on a secondary basis. In the non-Federal Government Table, the band 25.25-27.5 GHz is allocated to the EESS (space-to-space) and the sub-band 25.25-27 GHz is allocated to the standard frequency and time signal-satellite service (Earth-to-space), both on a secondary basis.

54. *Proposals.* In the *Notice*, the Commission noted that there are currently no FCC licensees using the secondary EESS allocation in the band 25.25-27.5 GHz and proposed to: (1) generally reflect changes previously made to the Federal Government Table in the *NTIA Manual*, including adopting a primary ISS allocation in that band and changing the directional indicator for the secondary EESS allocation in the sub-band 25.5-27 GHz from space-to-space to space-to-Earth; (2) correspondingly change the directional indicator for the secondary non-Federal Government EESS allocation in that sub-

¹¹¹ Lockheed Martin Comments at 17.

¹¹² Medtronic Comments at 4-5.

band; (3) upgrade the Federal Government EESS allocation in that sub-band to primary status; and (4) delete the remainder of the secondary EESS allocation (25.25-25.5 GHz and 27-27.5 GHz).¹¹³

55. *Comments.* DigitalGlobe, Inc. (“DigitalGlobe”) and Space Imaging, LLC (“Space Imaging”) express concern about the proposal in the *Notice* to upgrade from secondary to primary status only the Federal Government EESS allocation in the sub-band 25.5-27 GHz.¹¹⁴ DigitalGlobe and Space Imaging contend that the non-Federal Government EESS allocation in that sub-band should also be upgraded to meet the requirements of the commercial remote sensing industry and to be consistent with the Fact Sheet on U.S. Commercial Remote Sensing Policy that was released by the White House on April 25, 2003.¹¹⁵ This document states the fundamental goal of this policy is to “advance and protect U.S. national security and foreign policy interests by maintaining the nation’s leadership in remote sensing space activities, and by sustaining and enhancing the U.S. remote sensing industry;” and further states that U.S. companies are “encouraged to build and operate commercial remote sensing space systems whose operational capabilities, products and services are superior to any current or planned foreign commercial systems.”¹¹⁶ DigitalGlobe and Space Imaging state that first generation commercial remote sensing satellite systems use the band 8025-8400 MHz, but this band has limitations for advanced commercial operations because the bandwidth is constrained – accordingly, the U.S. commercial remote sensing industry has identified the band 25.5-27 GHz for wider bandwidth operations.¹¹⁷ DigitalGlobe states that the *Notice* provides no justification for why the latter band should be upgraded to primary only for Federal Government EESS users and not for commercial EESS users, and concludes that NTIA, in making its proposal to the Commission, simply overlooked commercial requirements.¹¹⁸

56. *Decision.* We are adopting the proposals pertaining to the band 25.25-27.5 GHz set forth in the *Notice*, except that we are maintaining, rather than deleting, the secondary non-Federal Government allocation for the EESS (space-to-space) in that band. We take the latter action to allow flexibility for both space-to-space and space-to-Earth operations by Federal and non-Federal Government users in that band. With respect to DigitalGlobe’s and Space Imaging’s concerns, we find that these two companies have presented evidence that the non-Federal Government, as well as the Federal Government, EESS allocation in the sub-band 25.5-27 GHz band should be upgraded to primary status, but we conclude that we have insufficient basis to upgrade that allocation at this time. The *Notice* did not propose to upgrade the non-Federal Government allocation, and – based on the limited record in this proceeding – we are unable to conclusively determine whether Federal Government fixed, mobile, ISS, and EESS users of the sub-band 25.5-27 GHz would be adversely affected by this upgrade. Accordingly, we decline to take that

¹¹³ *Notice* at 19786.

¹¹⁴ See “Comments of DigitalGlobe, Inc.,” filed May 15, 2003, ET Docket No. 02-305, at 1-2; “Written *Ex Parte* Presentation in ET Docket No. 02-305; RM-10331,” filed by Space Imaging on June 24, 2003, at 1-2. DigitalGlobe also made an *ex parte* presentation to the Commission’s Office of Engineering and Technology on May 21, 2003. All three of these filings were received well after both the comment deadline of February 10, 2003 and the reply comment deadline of March 10, 2003 in this proceeding. In a Motion for Acceptance of Late-Filed Comments, filed on May 15, 2003, DigitalGlobe states that it was unaware until after the comment and reply comment deadlines had passed that this proceeding was relevant to its operations. We are herein accepting DigitalGlobe’s comments and have fully considered them and the *ex parte* presentations of DigitalGlobe and Space Imaging in arriving at the decisions set forth in this *Report and Order*.

¹¹⁵ See Fact Sheet at <http://www.fas.org/jrp/offdocs/nspd/remsens.html>

¹¹⁶ *Id.* at 2-3.

¹¹⁷ DigitalGlobe Comments at 1-2; Space Imaging *Ex Parte* Presentation at 2-3.

¹¹⁸ DigitalGlobe Comments at 11.

action at this time. However, we plan to explore in the WRC-03 implementation proceeding referenced in paragraph 33, *supra*, whether that change could be made without adversely impacting Federal Government users of that sub-band. In the interim, because non-Federal Government EESS providers will use that sub-band on a secondary basis to Federal Government users, it is incumbent that EESS applicants coordinate their proposed operations with NTIA in order to protect those users. Accordingly, we are adopting the changes for the band 25.25-27.5 GHz proposed in the *Notice*, except for maintaining the secondary non-Federal Government allocation for the EESS (space-to-space) in that band, as shown in Appendix B.

G. Other Allocation Issues

(1) Secondary AMS(R)S Allocation in the Band 136-137 MHz

57. *Background.* At WRC-97, the United States proposed to delete all secondary allocations from the band 136-137 MHz in order to make the band available exclusively to the aeronautical mobile (route) service (“AM(R)S”) in an attempt to satisfy existing and future AM(R)S requirements.¹¹⁹ In particular, the U.S. proposed that footnote 5.198 be modified to delete the secondary allocation for the aeronautical mobile-satellite (route) service (“AMS(R)S”) from the band 136-137 MHz. The U.S. stated that there are no plans to implement AMS(R)S in the band 136-137 MHz. WRC-97 modified footnote 5.198 consistent with the U.S. proposals. Footnote US244 states that existing METSATS in this band may continue to operate on a not-to-interfere basis until January 1, 2002.

58. *Proposals.* The *Notice* proposed a footnote change in the U.S. Table in order to delete the unused AMS(R)S allocation from the band 136-137 MHz. In addition, the *Notice* proposed a footnote change to remove the expired transition plan for METSAT use of the band 136-137 MHz.¹²⁰

59. *Decision.* No party commented on the proposals pertaining to the band 136-137 MHz set forth in the *Notice*. We are adopting these proposals, as shown in Appendix B. This action will bring the U.S. Table in the band 136-137 MHz into conformance with the band’s use by the AM(R)S, remove the potentially conflicting AMS(R)S secondary allocation, and remove the expired transition plan for METSAT use of the band.

(2) The Band 420-450 MHz

60. *Background.* The band 420-450 MHz is allocated to the radiolocation service on a primary basis for Federal Government use and footnote G2 generally limits such operations to military applications.¹²¹ Additionally, footnote US217 states that, along the shorelines of the contiguous 48 states and Alaska, pulse-ranging radiolocation systems in the band 420-450 MHz and spread spectrum radiolocation systems in the sub-band 420-435 MHz may be authorized for Federal and non-Federal Government use on a secondary basis, except for those systems located within the geographic areas listed in footnote US228.¹²² The band 420-450 MHz is also allocated to the amateur service on a secondary basis; however, footnote US7 states that transmitters in the amateur service operating in that band in

¹¹⁹ See U.S. WRC-97 Proposals at 66.

¹²⁰ *Notice* at 19787-88.

¹²¹ See 47 C.F.R. § 2.106, footnote G2.

¹²² See 47 C.F.R. § 2.106, footnotes US217, US228.

certain geographic areas are limited to 50 watts peak envelope power (“PEP”) unless the Commission can reach an agreement with the applicable military frequency coordinator.¹²³

61. *Proposals.* In the *Notice*, the Commission, in response to a request from NTIA on behalf of the U.S. Army, proposed to modify footnotes to the U.S. Table to more than double the combined size of the geographical area in Texas and New Mexico where the maximum transmitter power that amateur radio stations may use in the band 420-450 MHz would generally be limited to 50 watts PEP, rather than the usual limit of 1.5 kW PEP. In its request to the Commission, NTIA states that this geographical area must be extended to prevent interference from amateur radio operations to a New Mexico missile test range. NTIA cites Army concerns that amateur operations in this area present an interference threat to missiles launched at Fort Wingate, NM, aimed at the airspace over White Sands Missile Range, NM, because there is now a Department of Defense test and evaluation center that uses areas west and south of Albuquerque, NM.¹²⁴ Also in response to a request from NTIA, the Commission stated that it intended to place an informational footnote in its Rules pertaining to Federal Government wind profiler radar (“WPR”) radiolocation use of the sub-band 448-450 MHz. Finally, the *Notice* requested comment on whether non-Federal Government WPRs should also be allowed in that sub-band on either a primary or secondary basis and on the impact of WPRs on non-Federal Government operations permitted in that sub-band.¹²⁵

62. *Comments.* With respect to the Army’s request, ARRL, the National Association for Amateur Radio (“ARRL”) contends that the Army has not provided sufficient information to permit an evaluation of whether such a large area of restricted amateur radio operations is necessary. ARRL therefore requests that the Commission and NTIA cooperatively determine whether this area is overly broad. However, ARRL acknowledges that a 50 watt PEP power limitation is generally not burdensome on radio amateurs who use FM repeaters and digital communications techniques at 440-450 MHz. Rather, ARRL maintains, such a limitation would restrict principally those amateurs who experiment with weak-signal terrestrial communications and some satellite experimenters, as well as those involved with Earth-moon-Earth communications in the band 420-440 MHz. ARRL recommends that the Commission establish an expedited method of processing requests for such use in cases where amateurs are able to reach agreements with military area frequency coordinators.¹²⁶ Douglas L. Hanz, an amateur radio licensee, argues that the majority of military use of the band 420-450 MHz has been in the sub-band 420-430 MHz, and that use of this sub-band by amateurs has been very limited. However, Mr. Hanz contends, in the band 440-450 MHz, amateur station powers higher than 50 watts PEP can be authorized throughout Texas and New Mexico if those stations’ antenna gains are limited. Mr. Hanz therefore proposes that amateur radio stations be permitted to use 110 watts PEP in that band with a restriction of 6dBi antenna gain, inclusive of transmission line loss.¹²⁷

63. With respect to WPR use of the band 448-450 MHz, ARRL states that there is a substantial potential for WPRs to have an impact on amateur radio stations that use the 449 MHz center frequency for FM repeater operation on a secondary basis to the Federal Government radiolocation

¹²³ See 47 C.F.R. § 2.106, footnote US7. Sub-bands within the band 420-450 MHz are also allocated to the amateur-satellite, land mobile, and space operation services and for space telecommand and low power radio control operations.

¹²⁴ See Letter from Acting Associate Administrator, Office of Spectrum Management, NTIA to Chief, OET, FCC, dated August 8, 2002, Doc. 3256311.

¹²⁵ *Notice* at 19788-89.

¹²⁶ ARRL Comments at 4-6.

¹²⁷ Douglas L. Hanz Comments at 1.

service. ARRL concedes that use of the band 448-450 MHz by Federal Government WPRs is unavoidable, but requests that the Commission require siting coordination or notification in final rules for Federal Government WPRs. ARRL also asserts that there is no need to allow non-Federal Government WPRs to use this band because there is no support for such use.¹²⁸

64. *Decision.* We are adopting the proposals pertaining to the band 420-450 MHz set forth in the *Notice*, as shown in Appendix B. With regard to the recommendation of ARRL, we note that our license processing procedures are not subject to rulemaking;¹²⁹ however, we always seek to process applications as expeditiously as possible. With regard to Mr. Hanz's concern, we observe that there already is a procedure by which amateur licensees can use powers greater than 50 watts; *i.e.*, by reaching agreement with a military area frequency coordinator. As indicated in NTIA's correspondence to us of August 2002, the Army finds that the area in Texas and New Mexico where amateur transmitter power in the band must be limited should be expanded to protect missile testing and evaluation at a test range in New Mexico. Accordingly, we are adopting our proposal to modify footnotes to the U.S. Table to expand the area in Texas and New Mexico where the maximum transmitter power that amateur radio stations may use in the band 420-450 MHz would generally be limited to 50 watts PEP. With regard to permitting non-Federal Government WPR use of the sub-band 448-450 MHz, only ARRL commented, and it is strongly opposed. Because no one expresses an interest in such non-Federal use, we will not permit non-Federal Government WPR use in the 448-450 MHz sub-band.

(3) On-board Mobile Radiotelephony Communications

65. *Background.* In most of the world, the maritime mobile frequencies that may be used for maritime on-board mobile radiotelephony communications are listed in footnote 5.287.¹³⁰ However, in the territorial waters of the United States, some of the frequencies used for on-board communications differ from the frequencies used in the rest of the world.¹³¹ At WRC-97, footnote 5.287 was revised to permit the use of equipment designed for 12.5 kHz channel spacing that could be used in U.S. territorial waters and other parts of the world. Such narrowband on-board mobile radiotelephony equipment may also use the following additional carrier frequencies: 457.5375 MHz, 457.5625 MHz, 467.5375 MHz, and 467.5625 MHz.¹³²

66. *Proposals.* In the *Notice*, the Commission proposed to replace international footnote 669 with footnote 5.287 in the U.S. Table for the band 456-470 MHz. The effect of this proposal would be to

¹²⁸ ARRL Comments at 7-9.

¹²⁹ See 5 U.S.C. § 553(b)(3)(A).

¹³⁰ Footnote 5.287 reads as follows: "In the maritime mobile service, the frequencies 457.525 MHz, 457.550 MHz, 457.575 MHz, 467.525 MHz, 467.550 MHz and 467.575 MHz may be used by on-board communication stations. Where needed, equipment designed for 12.5 kHz channel spacing using also the additional frequencies 457.5375 MHz, 457.5625 MHz, 467.5375 MHz and 467.5625 MHz may be introduced for on-board communications. The use of these frequencies in territorial waters may be subject to the national regulations of the administration concerned. The characteristics of the equipment used shall conform to those specified in Recommendation ITU-R M.1174 (see Resolution 341 (WRC-97))."

¹³¹ Footnote 5.288 reads as follows: "In the territorial waters of the United States and the Philippines, the preferred frequencies for use by on-board communication stations shall be 457.525 MHz, 457.550 MHz, 457.575 MHz and 457.600 MHz paired, respectively, with 467.750 MHz, 467.775 MHz, 467.800 MHz and 467.825 MHz. The characteristics of the equipment used shall conform to those specified in Recommendation ITU-R M.1174." See 47 C.F.R. § 80.373 (g), wherein these frequencies are listed in our Rules for private communications, limited to on-board communications.

¹³² Previously, all on-board mobile radiotelephony equipment used 25 kHz channel spacing.

permit U.S. licensees to use maritime mobile equipment that is more spectrum-efficient and that has access to ten instead of six channels for on-board communications in areas outside U.S. territorial waters.¹³³

67. *Decision.* No party commented on our proposal to replace international footnote 669 with footnote 5.287 in the U.S. Table for the band 456-470 MHz, thereby revising the frequency use provision for on-board mobile radiotelephony maritime communications. Accordingly we are adopting this proposal, as shown in Appendix B. This action will permit more efficient maritime mobile equipment to be employed outside U.S. territorial waters.

(4) IFPRS Use in the Bands 2.1-2.2 GHz and 10.7-11.7 GHz

68. *Background.* The International Fixed Public Radiocommunication Services ("IFPRS") were the original means by which international telephone calls were completed. However, the IFPRS have atrophied as first overseas voice cables, then FSS links, and now fiber optic cables have essentially replaced radio for international calling. Footnotes NG23 and NG41 state that frequencies in the band 2100-2200 MHz and in the bands 3700-4200 MHz, 5925-6425 MHz, and 10.7-11.7 GHz, respectively, may be used for IFPRS communications.¹³⁴ However, only the bands 3700-4200 MHz and 5925-6425 MHz ("C-band") are currently in use for IFPRS, and those bands are used by only three licensees on Caribbean islands.

69. *Proposals.* In the *Notice*, the Commission, in order to remove regulations that are no longer needed, proposed to delete footnote NG23, which pertains to the band 2100-2200 MHz, and to revise footnote NG41 to remove the band 10.7-11.7 GHz because there are no longer any IFPRS licensees operating in either of these bands. The Commission also proposed to delete all cross-references to Part 23, except for C-band, from column 6 of the Table of Frequency Allocations.¹³⁵

70. *Comments.* Only PanAmSat Corporation ("PanAmSat") commented on our proposal to reduce the spectrum allocated for the IFPRS. PanAmSat supports elimination of the unused IFPRS allocations in the bands 2100-2200 MHz and 10.7-11.7 GHz, and also recommends that, in C-band, we prohibit new IFPRS facilities. PanAmSat states that, given the antiquated nature of the IFPRS, there is no need for additional such systems in the C-band and recommends that the few existing systems in the Caribbean islands be grandfathered.¹³⁶

71. *Decision.* We are adopting the proposals pertaining to the IFPRS set forth in the *Notice*, as shown in Appendix B, but are rejecting PanAmSat's recommendation to prohibit new C-band IFPRS facilities. There is no opposition to the proposals relating to the IFPRS; however, PanAmSat recommends that we take additional action. While we concur with PanAmSat that new IFPRS facilities are unlikely to be required in C-band, we do not want to foreclose the opportunity for additional use of this service in remote island areas if it is required. Further, we have not given interested parties sufficient notice in this proceeding to prohibit such facilities.¹³⁷ Additionally, there would be no significant administrative advantage of such a prohibition, as C-band IFPRS rules must be retained for existing facilities. Accordingly, we deny PanAmSat's request.

¹³³ *Notice* at 19790.

¹³⁴ *See* 47 C.F.R. 2.106, footnotes NG23 and NG41.

¹³⁵ *Notice* at 19790.

¹³⁶ PanAmSat Comments at 2.

¹³⁷ *See* 5 U.S.C. § 553(b).

(5) Secondary MSS Use of the band 14-14.5 GHz

72. *Background.* The band 14-14.5 GHz is allocated for FSS uplinks on a primary basis for non-Federal Government use. This band is heavily used by Very Small Aperture Terminals (“VSATs”) for uplinking to geostationary satellites.¹³⁸ These VSAT systems provide video and data communications and are widely deployed at business locations, ranging from the largest corporate headquarters to the smallest convenience stores. In 2001, the Commission authorized NGSO FSS gateway and user terminal uplinks to operate in the band 14-14.5 GHz.¹³⁹ The band 14-14.5 GHz is also allocated for Land Mobile Satellite Service (“LMSS”) uplinks on a secondary basis for non-Federal Government use. This LMSS allocation is used by OmniTracs, a satellite-based mobile communications and tracking system that provides real-time messaging and position reporting between fleets and their operations centers.¹⁴⁰

73. The sub-band 14-14.2 GHz is allocated to the radionavigation service on a primary basis for Federal and non-Federal Government use; however, stations in that service operate on a secondary basis to FSS uplinks.¹⁴¹ The sub-band 14-14.2 GHz is also allocated to the SRS on a secondary basis for Federal and non-Federal Government use. In addition, the sub-band 14.2-14.4 GHz is allocated to the mobile except aeronautical mobile service on a secondary basis for non-Federal Government use. The Commission has made this spectrum available for assignment to television pickup and television non-broadcast pickup stations in the Local Television Transmission Service.¹⁴² The sub-band 14.4-14.5 GHz is allocated to the fixed and mobile services on a secondary basis for Federal Government use. Finally, footnote US203 states that radio astronomy observations of the formaldehyde line frequencies 14.47-14.5 GHz may be made at certain observatories.¹⁴³

74. *Proposals.* In the *Notice*, the Commission observed that LMSS operates on the band 14-14.5 GHz in the United States on a secondary basis without causing harmful interference to ubiquitously deployed VSATs and that other nations have implemented MMSS uplinks in the band 14-14.5 GHz on a secondary basis. The Commission also observed that it agreed with the *U.S. WRC-97 Proposals* that using the same or similar terminals to offer MMSS services in the band 14-14.5 GHz should be compatible with other services in this band, especially since the LMSS allocation has been successfully used in the United States for some time. Accordingly, the Commission proposed in the *Notice* to allocate the band 14-14.5 GHz to the MSS (Earth-to-space) except AMSS on a secondary basis for non-Federal Government use.¹⁴⁴

¹³⁸ Our database indicates that there are 2672 authorizations issued for GSO FSS earth stations in the 14-14.5 GHz band. The authorizations do not indicate the actual number of earth stations or antennas that a licensee might deploy. For example, since this is a VSAT band, a single GSO FSS authorization could cover several hundred VSAT antennas.

¹³⁹ See *Amendment of Parts 2 and 25 of the Commission’s Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range*, ET Docket No. 98-206, *First Report and Order and Further Notice of Proposed Rule Making*, 16 FCC Rcd 4096 (2001).

¹⁴⁰ Qualcomm’s OmniTracs service processes more than six million transactions each day sent to and from a quarter-million trucks. See *Qualcomm Service Keeps on Trucking*, July 13, 2001 at <http://www.business2.com/articles/web/print/0,1650,16490,FF.html>.

¹⁴¹ See 47 C.F.R. § 2.106, footnote US292.

¹⁴² See 47 C.F.R. Part 101, Subpart J. Our licensing database shows 24 Local Television Transmission, 1 TV pickup, 1 Industrial/ Business Pool, 1 point-to-point microwave, and 2 land mobile radiolocation records for the band 14.2-14.4 GHz.

¹⁴³ See 47 C.F.R. § 2.106, footnote US203.

¹⁴⁴ *Notice* at 19791.

75. *Comments.* Boeing and PanAmSat generally support allocating the band 14-14.5 GHz to the MSS on a secondary basis. However, Boeing recommends that the prohibition against secondary AMSS use be reconsidered and PanAmSat urges the Commission to clarify that MMSS use of this band is contemplated solely as an adjunct to FSS.¹⁴⁵ Boeing contends that, pursuant to Resolution 216 (Rev.WRC-2000) and Agenda Item 1.11 of WRC-03, domestic and international study groups have determined that appropriately designed AMSS systems can operate on a secondary basis in the band 14-14.5 GHz without causing harmful interference to other authorized services. Accordingly, Boeing states, the United States is submitting a proposal to WRC-03 to remove the prohibition on AMSS, thus permitting all forms of MSS to be provided in this band.¹⁴⁶ PanAmSat contends that it would be impractical and a waste of valuable FSS spectrum to license the band 14-14.5 GHz for stand-alone MMSS, given that the primary use of the band necessarily must remain for FSS facilities.¹⁴⁷

76. *Decision.* We are allocating the band 14-14.5 GHz to the MSS, including AMSS (Earth-to-space), for non-Federal Government use on a secondary basis, as set forth in the new Rules in Appendix B. There is no opposition to this allocation. Consistent with the comments of Boeing regarding AMSS, we believe that such use of the band appears to be technically feasible and would be helpful in meeting the growing demand for two-way broadband data and communications capabilities for commercial aircraft passengers and crew. Further, WRC-03 added a worldwide secondary AMSS allocation in this band.¹⁴⁸ We find that conforming the US Table to this recent international allocation is desirable because it will facilitate an important new use of the 14-14.5 GHz band on a non-interference basis to other uses of the band. We further find that no party need be adversely impacted by this action. However, we note that the SRS has a secondary allocation in a portion of this band and NASA uses that allocation as a downlink for its Tracking and Data Relay Satellite System (“TDRSS”). Further, the National Science Foundation (“NSF”) operates radio astronomy services (“RAS”) in the band 14.47-14.50 GHz in accordance with footnote US203 and Radio Astronomy is allocated on a secondary basis internationally. Therefore, users of AMSS will need to deal with protection of radio astronomy. We also note that a number of administrations have specified specific protection requirements for radio astronomy. In December 2001, we issued Boeing a license to operate mobile earth stations aboard aircraft in the 14-14.5 GHz band and imposed several conditions on that license, including the conditions that Boeing not constrain deployment of additional government stations operated by NASA in the SRS and that Boeing design and operate its system in accordance with its Technical Operational Coordination Agreement with NSF to facilitate the protection of RAS.¹⁴⁹ Boeing must continue to operate in accordance with the conditions that we imposed on its license and thus must continue to protect the TDRSS and RAS operations in the 14-14.5 GHz band. Further, in accordance with a Memorandum of Understanding (“MOU”) that we reached with NTIA in July 2002, we will protect those operations from interference by any future AMSS operations that we authorize in that band. Until we adopt final rules relating to allocation changes in the 14-14.5 GHz band or licensing of AMSS terminals in that band, we will place the following conditions on any additional system authorizations that we may issue in that band for a service similar to Boeing’s:

¹⁴⁵ Boeing Comments at 12; PanAmSat Comments at 3.

¹⁴⁶ Boeing Comments at 12.

¹⁴⁷ PanAmSat Comments at 3.

¹⁴⁸ See *WRC-03 Provisional Final Acts* at 34-38. These pages show a new “Mobile-satellite (Earth-to-space)” allocation in this band in all three Regions, as well as new footnote 5.AA13, which reads: “In the band 14-14.5 GHz, aircraft earth stations in the secondary aeronautical mobile-satellite service may also communicate with space stations in the fixed-satellite service. The provisions of Nos. 5.29, 5.30 and 5.31 apply.”

¹⁴⁹ See *The Boeing Company*, Order and Authorization, DA 01-3008 (released December 21, 2001).

- (1) The system shall be designed and operated so as not to cause harmful interference to TDRSS or RAS operations in the United States; and
- (2) The system shall not constrain future deployment of additional Federal Earth Stations in the SRS and RAS authorized pursuant to existing allocations.¹⁵⁰

Because RAS operations in the band 14.47-14.5 GHz operate on an unprotected basis domestically, we will maintain the protection of RAS as articulated in the conditions specified above. However, we note that the Commission may explore in a future rulemaking the protection levels or mechanism necessary to protect these services. The NTIA/FCC MOU states that “[t]he FCC will endeavor to reflect in its decisions conditions and constraints that explicitly protect NASA, NSF and other government operations (*i.e.*, ITU-R Recommendation RA. 769 for Radio Astronomy and ITU-R Recommendations SA. 5.10, S.A. 1017, S.A. 1155, SA. 1414, M. AMSS for TDRSS earth stations, and Boeing’s Technical Operational Coordination Agreement with NSF, dated 13 December 2001, and the letter of guidance provided to Boeing by NASA, dated December 178, 2001.”¹⁵¹

77. Lastly, as noted in paragraph 73, *supra*, Government fixed and mobile services are allocated on a secondary basis in the band 14.4-14.5 GHz. Protection criteria for these Government terrestrial operations may need to be developed in conjunction with AMSS service rules in the 14-14.5 GHz band.

78. Accordingly, we are allocating the 14-14.5 GHz band to all MSS uses on a secondary basis to the primary FSS in that band, as well as on a secondary basis to the primary radionavigation service in the 14-14.2 GHz sub-band.¹⁵² Finally, with regard to PanAmSat’s concern about MMSS, we observe that such use of the band 14-14.5 GHz – like other MSS use of this band – will be on a secondary basis to FSS, and we find no need to further restrict how MMSS should operate in the band.

H. Ministerial Amendments

79. *Proposals.* In the *Notice*, the Commission proposed to make a number of ministerial amendments to Part 2 of the Commission’s Rules. First, to eliminate both confusion and outdated provisions, the Commission proposed to:

- (1) replace international footnotes 599A, 608A, 608B, and 647B in the “Little LEO”¹⁵³ bands of the U.S. Table with footnotes 5.208, 5.219, 5.220, and 5.264, respectively, which are non-substantive changes;

¹⁵⁰ See “Memorandum of Understanding Between the Federal Communications Commission and the National Telecommunications and Information Administration Addressing the Aeronautical Mobile-Satellite Service In the 14.0-14.5 GHz Band,” July 8, 2002, at 2.

¹⁵¹ *Id.*

¹⁵² We note that Appendix B lists the international footnotes pertaining to the 14-14.5 GHz band that were adopted at WRC-03.

¹⁵³ Little LEOs is the common name for Non-Voice Non-Geostationary MSS systems, which operate below 1 GHz. Little LEO downlink spectrum is allocated on a primary basis in the bands 137-137.025 MHz, 137.175-137.825 MHz, and 400.15-401 MHz, and on a secondary basis in the bands 137.025-137.175 MHz and 137.825-138 MHz. Little LEO uplink spectrum is allocated on a primary basis in the bands 148-150.05 MHz and 399.9-400.05 MHz.

(2) merge footnote US322 into US320, that is, add the bands 149.9-150.05 MHz and 399.9-400.05 MHz to footnote US320, and delete superfluous footnotes US322 and 599B from the U.S. Table;

(3) delete expired footnote US318 from the band 137-138 MHz and the Part 25 cross reference from the band 136-137 MHz; and

(4) delete expired text from section 25.202(a)(3), which concerns the allocation status of certain of the Little LEO bands.¹⁵⁴

80. Second, the Commission observed that, in WT Docket No. 01-289, it proposed to delete the Civil Air Patrol (“CAP”) from Part 87 of the Rules because the Commission has no formal relationship with the CAP, which is authorized by the U.S. Air Force and NTIA.¹⁵⁵ To be consistent with that proposal, in the *Notice* the Commission proposed to delete footnote US10, which states that several frequencies in the band 138-144 MHz are available for use by the CAP.¹⁵⁶

81. Third, the Commission proposed to delete international footnote 510 from the band 144-146 MHz in the non-Federal Government Table. This footnote, through its reference of Resolution 640, invited administrations to provide for the needs of international disaster communications and for the needs of emergency communications using certain amateur bands.¹⁵⁷

82. Fourth, the Commission proposed to revise footnote US48 to remove provisions regarding the band 5350-5460 MHz that are already provided elsewhere in the Table. That is, there is already a primary direct Table allocation for Federal Government radiolocation and a secondary direct Table allocation for non-Federal Government radiolocation in the band 5350-5460 MHz for this purpose.¹⁵⁸

83. Fifth, the Commission proposed to revise footnote US110 to remove provisions regarding certain bands that are already shown in the Table. That is, there are primary direct Table allocations for Federal Government radiolocation and secondary direct Table allocations for non-Federal Government radiolocation in all of the bands listed in footnote US110, except for the band 9200-9300 MHz, which is allocated to both the Federal and non-Federal Government radiolocation service on a secondary basis.¹⁵⁹

84. Sixth, the Commission proposed to revise footnote US310 to specify the pfd limits for all angles of arrival. Currently US310 specifies only the maximum and minimum pfd limits and references CCIR Recommendation 510-1, which has been renumbered as Recommendation ITU-R SA.510-2, for the specific requirements.¹⁶⁰

¹⁵⁴ *Notice* at 19792.

¹⁵⁵ See *Review of Part 87 of the Commission's Rules Concerning the Aviation Radio Service*, WT Docket No. 01-289, *Notice of Proposed Rule Making*, 16 FCC Rcd 19,005 at ¶ 35.

¹⁵⁶ *Notice* at 19792.

¹⁵⁷ *Id.*

¹⁵⁸ *Id.*

¹⁵⁹ *Id.* at 19793.

¹⁶⁰ *Id.*

85. Seventh, the Commission proposed to add a reference to footnote NG167 in the band 17.3-17.7 GHz to explicitly tie the allocation for the broadcasting-satellite service in the band 17.3-17.7 GHz to its feeder link allocation in the band 24.75-25.25 GHz.¹⁶¹

86. Eighth, the Commission proposed to make the following changes to the rule part cross-references in column 6 of the Table of Frequency Allocations:

- (1) delete Part 87, the Aviation Services, from the band 29.8-30 MHz and add Part 87 to the bands 72-73 MHz, 74.6-74.8 MHz, and 156.2475-157.0375 MHz;
- (2) add Part 90, the Private Land Mobile Radio Services, to the band 410-420 MHz;
- (3) add Part 80, the Maritime Services, to the band 1525-1535 MHz; and
- (4) add Part 25, Satellite Communications, to the band 1660-1660.5 MHz.¹⁶²

87. Ninth, the Commission proposed to make the following changes to eliminate outdated requirements or correct typographical errors:

- (1) clarify in footnote US217 that spread spectrum radiolocation systems may be authorized for Federal and non-Federal Government use in the sub-band 420-435 MHz within Alaska and the contiguous 48 states and correct several typographical errors;
- (2) correct a typographical error in footnote US316 by changing the NEXRAD expansion band from 2900-3100 MHz to 2900-3000 MHz;
- (3) delete the references to footnote NG30 in the band 806-894 MHz and to footnote NG43 in the band 806-849 MHz from the non-Federal Government Table because these footnotes have previously been deleted, but were not fully removed from the non-Federal Government Table;
- (4) delete footnote NG63 because the Commission's licensing files show that there are no television broadcast translator stations still authorized to operate in the band 806-890 MHz (old TV channels 70-83); and
- (5) delete footnote US54 because Federal Government radiolocation systems that could cause harmful interference to ARNS have had at least since 1961 to move to other frequency bands.¹⁶³

88. Tenth, the Commission proposed to replace the reference to international footnote 5.149 with footnote US342 in the U.S. Table for several frequency bands and proposed to add two additional bands to the text of that footnote. In addition, it proposed to delete footnote 5.149 from the band 1660.5-1668.4 MHz, and proposed to revise US342 by deleting the indication showing which frequency bands are used for spectral line observations. The Commission also requested comment on whether US342 could be revised to state that licensees are "urged," (similar to footnote 5.149) instead of "required" to take all practicable steps to protect the radio astronomy service ("RAS") from harmful interference.¹⁶⁴

¹⁶¹ *Id.*

¹⁶² *Id.*

¹⁶³ *Id.* at 19793-94.

¹⁶⁴ *Id.* at 19794.

89. Finally, the Commission observed that the band 73-74.6 MHz is allocated exclusively to the RAS, which is a passive service, and that passive bands are listed in footnote US246. Accordingly, it proposed to add the band 73-74.6 MHz to US246.¹⁶⁵

90. *Decision.* No party commented on any of the proposals pertaining to ministerial amendments to Part 2 of the Commission's Rules set forth in the *Notice*. We are adopting these proposals, as shown in Appendix B, to enhance the accuracy of the U. S. Table. In addition, on our own motion, we are making nine additional ministerial changes. We are merging the bands 698-746 MHz and 746-764 MHz as the band 698-764 MHz because the allocations in these bands are exactly the same and thus, this action simplifies our Table. We are deleting the band 34.2-34.7 GHz from footnote US252 because the SRS allocation for this band has been made a direct Table allocation.¹⁶⁶ We are deleting the obsolete list of coordinated observatories from footnote US277 and are instead cross referencing the list of observatories in footnote US355.¹⁶⁷ We are correcting footnote US355 in order to use the proper symbols for degree, minute, and second.¹⁶⁸ We remove the "S" reference in footnote US303 to make the cross-reference to ITU Radio Regulation No. 21.16 consistent with current practice. We are updating footnote NG114 to refer to the Public Mobile Service, not the Domestic Public Service, which no longer exists.¹⁶⁹ At the request of NTIA, we are adding footnote 5.391, which prohibits high-density mobile systems, to the band 2200-2290 MHz, which is Federal Government exclusive band.¹⁷⁰ We are adding cross reference to the Aviation Services (Part 87) in the bands 2310-2320 MHz and 2345-2385 MHz. We also remove those footnotes to the Table of Frequency Allocations that are no longer in effect because they have been suppressed in the ITU *Radio Regulations*. These additional ministerial actions will update and otherwise remove errors from the U.S. Table.

FINAL REGULATORY FLEXIBILITY CERTIFICATION

91. The Regulatory Flexibility Act of 1980, as amended ("RFA"),¹⁷¹ requires that a final regulatory analysis be prepared for notice-and-comment rule making proceedings, unless the agency certifies that the "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities."¹⁷² The RFA generally defines the term "small entity" as having the same

¹⁶⁵ *Id.* at 19795.

¹⁶⁶ 47 C.F.R. § 2.106, footnote US252; *see* ¶ 50, *supra*.

¹⁶⁷ 47 C.F.R. § 2.106, footnote US277.

¹⁶⁸ 47 C.F.R. § 2.106, footnote US355.

¹⁶⁹ Footnote NG114 states that, in the Gulf of Mexico offshore from the Louisiana-Texas coast, the band 476-494 MHz (TV channels 15, 16 and 17) is allocated to the Domestic Public and Private Land Mobile Radio Services in accordance with the regulations set forth in Parts 22 and 90, respectively. 47 C.F.R. § 2.106, footnote NG114. However, it is the service rules for the Public Mobile Services that are codified in 47 C.F.R. Part 22 and the particular use described in footnote NG114 is codified at 47 C.F.R. Part 22, Subpart I, which is the Offshore Radiotelephone Service.

¹⁷⁰ Footnote 5.391 reads as follows: "In making assignments to the mobile service in the bands 2025-2110 MHz and 2200-2290 MHz, administrations shall not introduce high-density mobile systems, as described in Recommendation ITU-R SA.1154, and shall take that Recommendation into account for the introduction of any other type of mobile system." Footnote 5.391 has previously been added to the band 2025-2110 MHz in both the Federal and non-Federal Government Tables.

¹⁷¹ *See* U.S.C. § 603. The RFA, *see* 5 U.S.C. § 601 -612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. Law No. 104-121, Title II, 110 Stat. 857 (1996).

¹⁷² 5 U.S.C. § 605(b).

meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”¹⁷³ In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.¹⁷⁴ A “small business concern” is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (“SBA”).¹⁷⁵

92. This Report and Order amends Parts 2, 25, and 87 of our Rules in order to implement domestically various allocation decisions from several World Radiocommunication Conferences concerning the frequency bands between 28 MHz and 36 GHz and to otherwise update our Rules in this frequency range. These allocations mainly affect Federal agencies.¹⁷⁶ Those allocations that are most significant to non-Federal Government operations are: (1) implementing generic L-band MSS allocations; (2) allocating the band 1164-1189 MHz to the RNSS; and (3) deleting unused and limited FSS and BSS allocations from the band 2500-2690 MHz. Concerning L-band MSS, currently there is only one U.S. licensee. Concerning the RNSS allocation, only one or at most a few large companies are expected to be able to launch and maintain RNSS systems, which are expensive. The last action merely deletes unused allocations, with no direct effect on licensees or regulatees.

93. We have determined that the rules adopted in this R&O will not have a significant economic impact on a substantial number of small entities. Accordingly, we hereby certify that this R&O will not have a significant economic impact on a substantial number of small entities. The Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, will send a copy of this R&O, including this certification, to the Chief Counsel for Advocacy of the Small Business Administration.¹⁷⁷ A copy will also be published in the Federal Register.¹⁷⁸

ORDERING CLAUSES

94. Accordingly, IT IS ORDERED that pursuant to Sections 1, 4, 301, 302(a), 303, 307, 309, 316, 332, 334, and 336 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 151, 154, 301, 302(a), 303, 307, 309, 316, 332, 334, and 336, the Report and Order and the rules specified in Appendix B ARE ADOPTED.

95. IT IS FURTHER ORDERED that the late-filed comments of DigitalGlobe, Inc. to the *Notice of Proposed Rule Making* in this proceeding ARE ACCEPTED.

96. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this Report and Order, including the Final Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the Small Business Administration.

¹⁷³ 5 U.S.C. § 601(6).

¹⁷⁴ 5 U.S.C. § 601(3) (incorporating by reference the definition of “small business concern” in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies “unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register.”

¹⁷⁵ 15 U.S.C. § 632.

¹⁷⁶ See ¶¶ 5-6, *supra*.

¹⁷⁷ 5 U.S.C. § 605(b).

¹⁷⁸ *Id.*

97. IT IS FURTHER ORDERED that this proceeding IS TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

**APPENDIX A: PARTIES FILING COMMENTS AND REPLY COMMENTS IN RESPONSE
TO THE *NOTICE***

Comments

Aerospace and Flight Test Radio Coordinating Council
AirTV Limited
ARRL, the National Association for Amateur Radio
The Boeing Company
DigitalGlobe, Inc. (Late-Filed)
Inmarsat Ventures plc
Lockheed Martin Corporation
Medtronic, Inc.
PanAmSat Corporation

Reply Comments

AirTV Limited
The Boeing Company
Mobile Satellite Ventures Subsidiary LLC
Wireless Communications Association International, Inc.

APPENDIX B: FINAL RULES

For the reasons discussed in the preamble, the Federal Communications Commission amends 47 CFR Parts 2, 25, and 87 as follows:

PART 2 -- FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

1. The authority citation for Part 2 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 302a, 303, and 336, unless otherwise noted.

2. Section 2.1 is revised by adding the following definitions in alphabetic order:

§ 2.1 Terms and definitions.

* * * * *

Differential Global Positioning System (DGPS) Station. A differential RNSS station for specific augmentation of GPS.

Differential Radionavigation Satellite Service (Differential RNSS) Station. A station used for the transmission of differential correction data and related information (such as ionospheric data and RNSS satellite integrity information) as an augmentation to an RNSS system for the purpose of improved navigation accuracy.

* * * * *

3. Section 2.106, the Table of Frequency Allocations, is amended as follows:

- a. Revise pages 22-75.

- b. In the list of International Footnotes under heading I, remove footnotes 5.120, 5.148, 5.333, and 5.551; add footnotes 5.457A, 5.457B, 5.504A, 5.504B, 5.504C, 5.506A, 5.506B, 5.508A, and 5.509A; and revise footnotes 5.505 and 5.508.

- c. In the list of International Footnotes under heading II., remove footnotes 591, 599A, 599B, 608A, 608B, 647B, 669, and 792A.

- d. In the list of United States (US) Footnotes, revise US7, US48, US78, US110, US217, US244, US246, US252, US258, US262, US276, US277, US278, US303, US310, US316, US320, US342, and US355; remove US10, US54, US228, US269, US318, US322, and US328; and add footnotes US384, US385, and US386.

- e. In the list of Non-Federal Government (NG) Footnotes, remove NG23, NG47, NG63, NG101, and NG102; and revise NG41 and NG114.

- f. In the list of Federal Government (G) Footnotes, revise footnote G2 and add footnote G129.

§ 2.106 Table of Frequency Allocations.

The revisions and additions read as follows:

* * * * *

28-33 MHz (HF/VHF)

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
28-29.7			28-29.89	28-29.7 AMATEUR AMATEUR-SATELLITE	Amateur (97)
				US340	
29.7-30.005				29.7-29.8 LAND MOBILE	Private Land Mobile (90)
				US340	
				29.8-29.89 FIXED	
			US340	US340	
			29.89-29.91 FIXED MOBILE	29.89-29.91	
			US340	US340	
			29.91-30	29.91-30 FIXED	
			US340	US340	
30.005-30.01			30-30.56 FIXED MOBILE	30-30.56	
30.01-37.5			30.56-32	30.56-32 FIXED LAND MOBILE	Private Land Mobile (90)
				NG124	
			32-33 FIXED MOBILE	32-33	
			See next page for 33-37.5 MHz		See next page for 33-37.5 MHz

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 30.01-37.5 MHz			33-34	33-34 FIXED LAND MOBILE NG124	Private Land Mobile (90)
			34-35 FIXED MOBILE	34-35	
			35-36	35-36 FIXED LAND MOBILE	Public Mobile (22) Private Land Mobile (90)
			36-37 FIXED MOBILE US220	36-37 US220	
			37-37.5	37-37.5 LAND MOBILE NG124	Private Land Mobile (90)
37.5-38.25 FIXED MOBILE Radio astronomy			37.5-38 Radio astronomy US342	37.5-38 LAND MOBILE Radio astronomy US342 NG59 NG124	
			38-38.25 FIXED MOBILE RADIO ASTRONOMY	38-38.25 RADIO ASTRONOMY	
5.149			US81 US342	US81 US342	
38.25-39.986 FIXED MOBILE			38.25-39 FIXED MOBILE	38.25-39	
			39-40	39-40 LAND MOBILE NG124	Private Land Mobile (90)
39.986-40.02 FIXED MOBILE Space research			40-42 FIXED MOBILE	40-40.98	ISM Equipment (18) Private Land Mobile (90)

40.02-40.98 FIXED MOBILE					
5.150				5.150 US210	
40.98-41.015 FIXED MOBILE Space research				40.98-42	
5.160 5.161					
41.015-44 FIXED MOBILE			5.150 US210 US220	US220	
5.160 5.161			42-46.6	42-43.69 FIXED LAND MOBILE	Public Mobile (22) Private Land Mobile (90)
				NG124 NG141	
44-47 FIXED MOBILE				43.69-46.6 LAND MOBILE	Private Land Mobile (90)
				NG124 NG141	
5.162 5.162A			46.6-47 FIXED MOBILE	46.6-47	
47-68 BROADCASTING	47-50 FIXED MOBILE	47-50 FIXED MOBILE BROADCASTING	47-49.6	47-49.6 LAND MOBILE	Private Land Mobile (90)
		5.162A		NG124	
5.162A 5.163 5.164 5.165 5.169 5.171	See next page for 50-68 MHz		See next page for 50-73 MHz	See next page for 50-72 MHz	See next page for 50-72 MHz

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 47-68 MHz	50-54 AMATEUR 5.162A 5.166 5.167 5.168 5.170		50-73	50-54 AMATEUR	Amateur (97)
	54-68 BROADCASTING Fixed Mobile 5.172	54-68 FIXED MOBILE BROADCASTING 5.162A		54-72 BROADCASTING	Broadcast Radio (TV) (73) Auxiliary Broadcasting (74)
68-74.8 FIXED MOBILE except aeronautical mobile	68-72 BROADCASTING Fixed Mobile 5.173	68-74.8 FIXED MOBILE		NG115 NG128 NG149	Public Mobile (22) Aviation (87) Private Land Mobile (90) Personal Radio (95)
	72-73 FIXED MOBILE			72-73 FIXED MOBILE	
	73-74.6 RADIO ASTRONOMY 5.178			73-74.6 RADIO ASTRONOMY US74	
	74.6-74.8 FIXED MOBILE			74.6-74.8 FIXED MOBILE	
	5.149 5.174 5.175 5.177 5.179			5.149 5.176 5.179		US246 US273	Aviation (87) Private Land Mobile (90)
74.8-75.2 AERONAUTICAL RADIONAVIGATION			74.8-75.2 AERONAUTICAL RADIONAVIGATION	Aviation (87)	
5.180 5.181			5.180		
75.2-87.5 FIXED MOBILE except aeronautical mobile	75.2-75.4 FIXED MOBILE 5.179		75.2-75.4 FIXED MOBILE US273	Private Land Mobile (90)	

	75.4-76 FIXED MOBILE	75.4-87 FIXED MOBILE	75.4-88	75.4-76 FIXED MOBILE NG3 NG49 NG56	Public Mobile (22) Private Land Mobile (90) Personal Radio (95)
5.175 5.179 5.184 5.187	76-88 BROADCASTING Fixed Mobile	5.182 5.183 5.188 87-100 FIXED MOBILE BROADCASTING		76-88 BROADCASTING NG128 NG129 NG149	Broadcast Radio (TV) (73) Auxiliary Broadcasting (74)
87.5-100 BROADCASTING	5.185				
5.190	88-100 BROADCASTING		88-108	88-108 BROADCASTING	Broadcast Radio (FM) (73) Auxiliary Broadcasting (74)
100-108 BROADCASTING			US93	US93 NG2 NG128 NG129	
5.192 5.194			108-117.975 AERONAUTICAL RADIONAVIGATION	108-117.975 AERONAUTICAL RADIONAVIGATION	Aviation (87)
108-117.975 AERONAUTICAL RADIONAVIGATION			US93 US343		
5.197 5.197A			117.975-121.9375 AERONAUTICAL MOBILE (R)	117.975-121.9375 AERONAUTICAL MOBILE (R)	
117.975-137 AERONAUTICAL MOBILE (R)			5.111 5.198 5.199 5.200 US26 US28		
			121.9375-123.0875	121.9375-123.0875 AERONAUTICAL MOBILE	
			5.198 US30 US31 US33 US80 US102 US213	5.198 US30 US31 US33 US80 US102 US213	
			123.0875-123.5875 AERONAUTICAL MOBILE		
			5.198 5.200 US32 US33 US112		
5.111 5.198 5.199 5.200 5.201 5.202 5.203 5.203A 5.203B			See next page for 123.5875-137 MHz		See next page for 123.5875-137 MHz

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 117.975-137 MHz			123.5875-128.8125 AERONAUTICAL MOBILE (R) 5.198 US26		Aviation (87)
			128.8125-132.0125 5.198	128.8125-132.0125 AERONAUTICAL MOBILE (R) 5.198	
			132.0125-136 AERONAUTICAL MOBILE (R) 5.198 US26		
			136-137 US244	136-137 AERONAUTICAL MOBILE (R) US244	
137-137.025 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.208A 5.209 SPACE RESEARCH (space-to-Earth) Fixed Mobile except aeronautical mobile (R)			137-137.025 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) US319 US320 SPACE RESEARCH (space-to-Earth)		Satellite Communications (25)
5.204 5.205 5.206 5.207 5.208			5.208		
137.025-137.175 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Fixed Mobile-satellite (space-to-Earth) 5.208A 5.209 Mobile except aeronautical mobile (R)			137.025-137.175 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Mobile-satellite (space-to-Earth) US319 US320		
5.204 5.205 5.206 5.207 5.208			5.208		
137.175-137.825 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.208A 5.209 SPACE RESEARCH (space-to-Earth) Fixed			137.175-137.825 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) US319 US320 SPACE RESEARCH (space-to-Earth)		

Mobile except aeronautical mobile (R)			5.208		
5.204 5.205 5.206 5.207 5.208			5.208		
137.825-138 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Fixed Mobile-satellite (space-to-Earth) 5.208A 5.209 Mobile except aeronautical mobile (R)			137.825-138 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Mobile-satellite (space-to-Earth) US319 US320		
5.204 5.205 5.206 5.207 5.208			5.208		
138-143.6 AERONAUTICAL MOBILE (OR)	138-143.6 FIXED MOBILE RADIOLOCATION Space research (space-to-Earth)	138-143.6 FIXED MOBILE Space research (space-to-Earth)	138-144 FIXED MOBILE	138-144	
5.210 5.211 5.212 5.214		5.207 5.213			
143.6-143.65 AERONAUTICAL MOBILE (OR) SPACE RESEARCH (space-to-Earth)	143.6-143.65 FIXED MOBILE RADIOLOCATION SPACE RESEARCH (space-to-Earth)	143.6-143.65 FIXED MOBILE SPACE RESEARCH (space-to-Earth)			
5.211 5.212 5.214		5.207 5.213			
143.65-144 AERONAUTICAL MOBILE (OR)	143.65-144 FIXED MOBILE RADIOLOCATION Space research (space-to-Earth)	143.65-144 FIXED MOBILE Space research (space-to-Earth)	G30		
5.210 5.211 5.212 5.214		5.207 5.213			
144-146 AMATEUR AMATEUR-SATELLITE			144-148	144-146 AMATEUR AMATEUR-SATELLITE	Amateur (97)
5.216					
146-148 FIXED MOBILE except aeronautical mobile (R)	146-148 AMATEUR	146-148 AMATEUR FIXED MOBILE		146-148 AMATEUR	
	5.217	5.217			

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
148-149.9 FIXED MOBILE except aeronautical mobile (R) MOBILE-SATELLITE (Earth-to-space) 5.209	148-149.9 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.209		148-149.9 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) US319 US320 US323 US325	148-149.9 MOBILE-SATELLITE (Earth-to-space) US319 US320 US323 US325	Satellite Communications (25)
5.218 5.219 5.221	5.218 5.219 5.221		5.218 5.219 G30	5.218 5.219	
149.9-150.05 MOBILE-SATELLITE (Earth-to-space) 5.209 5.224A RADIONAVIGATION-SATELLITE 5.224B			149.9-150.05 MOBILE-SATELLITE (Earth-to-space) US319 US320 RADIONAVIGATION-SATELLITE		
5.220 5.222 5.223			5.223		
150.05-153 FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY	150.05-156.7625 FIXED MOBILE		150.05-150.8 FIXED MOBILE US216 G30	150.05-150.8 US216	
			150.8-152.855 US216	150.8-152.855 FIXED LAND MOBILE NG112 US216 NG4 NG51 NG124	Public Mobile (22) Private Land Mobile (90) Personal Radio (95)
5.149			152.855-154	152.855-154 LAND MOBILE NG4 NG124	Auxiliary Broadcasting (74) Private Land Mobile (90)
153-154 FIXED MOBILE except aeronautical mobile (R) Meteorological aids			154-156.2475 5.226	154-156.2475 FIXED LAND MOBILE NG112 5.226 NG117 NG124 NG148	Maritime (80) Private Land Mobile (90) Personal Radio (95)
154-156.7625 FIXED MOBILE except aeronautical mobile (R)			156.2475-157.0375	156.2475-157.0375 MARITIME MOBILE	Aviation (87)
5.226 5.227	5.225 5.226 5.227				

156.7625-156.8375 MARITIME MOBILE (distress and calling)				
5.111 5.226		5.226 5.227 US77 US106 US107 US266	5.226 5.227 US77 US106 US107 US266 NG117	
156.8375-174 FIXED MOBILE except aeronautical mobile	156.8375-174 FIXED MOBILE	157.0375-157.1875 MARITIME MOBILE	157.0375-157.1875	Private Land Mobile (90)
		5.226 US214 US266 G109	5.226 US214 US266	
		157.1875-157.45	157.1875-157.45 LAND MOBILE MARITIME MOBILE	Maritime (80) Private Land Mobile (90)
		5.226 US223 US266	5.226 US223 US266 NG111	
		157.45-161.575	157.45-161.575 FIXED LAND MOBILE	Public Mobile (22) Maritime (80) Private Land Mobile (90)
		5.226 US266	5.226 US266 NG6 NG28 NG70 NG111 NG112 NG124 NG148 NG155	
		161.575-161.625	161.575-161.625 MARITIME MOBILE	Public Mobile (22) Maritime (80)
		5.226 US77	5.226 US77 NG6 NG17	
		161.625-161.775	161.625-161.775 LAND MOBILE	Public Mobile (22) Auxiliary Broadcasting (74)
5.226	5.226 NG6			
161.775-162.0125	161.775-162.0125 LAND MOBILE MARITIME MOBILE	Public Mobile (22) Maritime (80) Private Land Mobile (90)		
5.226 US266	5.226 US266 NG6			
5.226 5.229	5.226 5.230 5.231 5.232	See next page for 162.0125-174 MHz		See next page for 162.0125-174 MHz

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 156.8375-174 MHz			162.0125-173.2 FIXED US13 MOBILE	162.0125-173.2	Auxiliary Broadcasting (74) Private Land Mobile (90)
			5.226 US8 US11 US216 US223 US300 US312 G5	5.226 US8 US11 US13 US216 US223 US300 US312	
			173.2-173.4	173.2-173.4 FIXED Land mobile	Private Land Mobile (90)
			173.4-174 FIXED MOBILE G5	173.4-174	
174-223 BROADCASTING	174-216 BROADCASTING Fixed Mobile 5.234	174-223 FIXED MOBILE BROADCASTING	174-216	174-216 BROADCASTING NG115 NG128 NG149	Broadcast Radio (TV) (73) Auxiliary Broadcasting (74)
	216-220 FIXED MARITIME MOBILE Radiolocation 5.241 5.242		216-220 Fixed Mobile Radiolocation 5.241 G2 US210 US229	216-220 FIXED MOBILE except aeronautical mobile US210 US229 NG152 NG173	Maritime (80) Private Land Mobile (90) Personal Radio (95) Amateur (97)
	220-225 AMATEUR FIXED MOBILE Radiolocation 5.241		220-222 FIXED LAND MOBILE Radiolocation 5.241 G2 US335	220-222 FIXED LAND MOBILE	Private Land Mobile (90)
5.235 5.237 5.243		5.233 5.238 5.240 5.245	222-225 Radiolocation 5.241 G2	222-225 AMATEUR	Amateur (97)

223-230 BROADCASTING Fixed Mobile	225-235 FIXED MOBILE	223-230 FIXED MOBILE BROADCASTING AERONAUTICAL RADIONAVIGATION Radiolocation	225-235 FIXED MOBILE	225-235
5.243 5.246 5.247		5.250		
230-235 FIXED MOBILE		230-235 FIXED MOBILE AERONAUTICAL RADIONAVIGATION		
5.247 5.251 5.252		5.250	G27	
235-267 FIXED MOBILE			235-267 FIXED MOBILE	235-267
5.111 5.199 5.252 5.254 5.256			5.111 5.199 5.256 G27 G100	5.111 5.199 5.256
267-272 FIXED MOBILE Space operation (space-to-Earth)			267-322 FIXED MOBILE	267-322
5.254 5.257				
272-273 SPACE OPERATION (space-to-Earth) FIXED MOBILE				
5.254				
273-312 FIXED MOBILE				
5.254				
312-315 FIXED MOBILE Mobile-satellite (Earth-to-space) 5.254 5.255				
315-322 FIXED MOBILE				
5.254			G27 G100	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
322-328.6 FIXED MOBILE RADIO ASTRONOMY			322-328.6 FIXED MOBILE	322-328.6	
5.149			US342 G27	US342	
328.6-335.4 AERONAUTICAL RADIONAVIGATION 5.258			328.6-335.4 AERONAUTICAL RADIONAVIGATION 5.258		
5.259					
335.4-387 FIXED MOBILE			335.4-399.9 FIXED MOBILE	335.4-399.9	
5.254					
387-390 FIXED MOBILE Mobile-satellite (space-to-Earth) 5.208A 5.254 5.255					
390-399.9 FIXED MOBILE					
5.254			G27 G100		
399.9-400.05 MOBILE-SATELLITE (Earth-to-space) 5.209 5.224A RADIONAVIGATION-SATELLITE 5.222 5.224B 5.260			399.9-400.05 MOBILE-SATELLITE (Earth-to-space) US319 US320 RADIONAVIGATION-SATELLITE 5.260		
5.220					
400.05-400.15 STANDARD FREQUENCY AND TIME SIGNAL-SATELLITE (400.1 MHz)			400.05-400.15 STANDARD FREQUENCY AND TIME SIGNAL- SATELLITE (400.1 MHz)		
5.261 5.262			5.261		
400.15-401 METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.208A 5.209 SPACE RESEARCH (space-to-Earth) 5.263 Space operation (space-to-Earth)			400.15-401 METEOROLOGICAL AIDS (radiosonde) US70 METEOROLOGICAL- SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) US319 US320 US324	400.15-401 METEOROLOGICAL AIDS (radiosonde) US70 MOBILE-SATELLITE (space-to-Earth) US319 US320 US324 SPACE RESEARCH (space-to-Earth) 5.263	Satellite Communications (25)

5.262 5.264	SPACE RESEARCH (space-to-Earth) 5.263 Space operation (space-to-Earth)	Space operation (space-to-Earth)	
401-402 METEOROLOGICAL AIDS SPACE OPERATION (space-to-Earth) EARTH EXPLORATION-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) Fixed Mobile except aeronautical mobile	401-402 METEOROLOGICAL AIDS (radiosonde) US70 SPACE OPERATION (space-to-Earth) EARTH EXPLORATION- SATELLITE (Earth-to-space) METEOROLOGICAL- SATELLITE (Earth-to-space) US384	401-402 METEOROLOGICAL AIDS (radiosonde) US70 SPACE OPERATION (space-to-Earth) Earth exploration-satellite (Earth-to-space) Meteorological-satellite (Earth-to-space) US384	
402-403 METEOROLOGICAL AIDS EARTH EXPLORATION-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) Fixed Mobile except aeronautical mobile	402-403 METEOROLOGICAL AIDS (radiosonde) US70 EARTH EXPLORATION- SATELLITE (Earth-to-space) METEOROLOGICAL- SATELLITE (Earth-to-space) US345 US384	402-403 METEOROLOGICAL AIDS (radiosonde) US70 Earth exploration-satellite (Earth-to-space) Meteorological-satellite (Earth-to-space) US345 US384	Personal Radio (95)
403-406 METEOROLOGICAL AIDS Fixed Mobile except aeronautical mobile	403-406 METEOROLOGICAL AIDS (radiosonde) US70 US345 G6	403-406 METEOROLOGICAL AIDS (radiosonde) US70 US345	
406-406.1 MOBILE-SATELLITE (Earth-to-space) 5.266 5.267	406-406.1 MOBILE-SATELLITE (Earth-to-space) 5.266 5.267		
406.1-410 FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY 5.149	406.1-410 FIXED US13 MOBILE RADIO ASTRONOMY US74 US117 G5 G6	406.1-410 RADIO ASTRONOMY US74 US13 US117	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
410-420 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (space-to-space) 5.268			410-420 FIXED US13 MOBILE SPACE RESEARCH (space-to-space) 5.268 G5	410-420 US13	Private Land Mobile (90)
420-430 FIXED MOBILE except aeronautical mobile Radiolocation 5.269 5.270 5.271			420-450 RADIOLOCATION US217 G2 G129	420-450 Amateur US7 NG135	Private Land Mobile (90) Amateur (97)
430-440 AMATEUR RADIOLOCATION 5.138 5.271 5.272 5.273 5.274 5.275 5.276 5.277 5.280 5.281 5.282 5.283	430-440 RADIOLOCATION Amateur 5.271 5.276 5.277 5.278 5.279 5.281 5.282				
440-450 FIXED MOBILE except aeronautical mobile Radiolocation 5.269 5.270 5.271 5.284 5.285 5.286			5.286 US7 US87 US230 G8	5.282 5.286 US87 US217 US230	
450-455 FIXED MOBILE			450-454 5.286 US87	450-454 LAND MOBILE 5.286 US87 NG112 NG124	Auxiliary Broadcasting (74) Private Land Mobile (90)
5.209 5.271 5.286 5.286A 5.286B 5.286C 5.286D 5.286E			454-456	454-455 FIXED LAND MOBILE NG12 NG112 NG148	Public Mobile (22) Maritime (80)
455-456 FIXED MOBILE 5.209 5.271 5.286A 5.286B 5.286C 5.286E	455-456 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.286A 5.286B 5.286C 5.209	455-456 FIXED MOBILE 5.209 5.271 5.286A 5.286B 5.286C 5.286E		455-456 LAND MOBILE	Auxiliary Broadcasting (74)

456-459 FIXED MOBILE 5.271 5.287 5.288			456-460	456-460 FIXED LAND MOBILE	Public Mobile (22) Maritime (80) Private Land Mobile (90)
459-460 FIXED MOBILE 5.209 5.271 5.286A 5.286B 5.286C 5.286E	459-460 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.286A 5.286B 5.286C 5.209	459-460 FIXED MOBILE 5.209 5.271 5.286A 5.286B 5.286C 5.286E			
460-470 FIXED MOBILE Meteorological-satellite (space-to-Earth)			460-470 Meteorological-satellite (space-to-Earth)	460-462.5375 FIXED LAND MOBILE 5.289 US201 US209 NG124	Private Land Mobile (90)
				462.5375-462.7375 LAND MOBILE 5.289 US201	Personal Radio (95)
				462.7375-467.5375 FIXED LAND MOBILE 5.287 5.289 US201 US209 US216 NG124	Private Land Mobile (90)
				467.5375-467.7375 LAND MOBILE 5.287 5.289 US201	Personal Radio (95)
				467.7375-470 FIXED LAND MOBILE 5.288 5.289 US201 US216 NG124	Private Land Mobile (90)
5.287 5.288 5.289 5.290				5.287 5.288 5.289 US201 US209 US216	

International Table			United States Table		FCC Rule Part(s)	
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government		
470-790 BROADCASTING	470-512 BROADCASTING Fixed Mobile 5.292 5.293	470-585 FIXED MOBILE BROADCASTING	470-608	470-512 FIXED NG127 LAND MOBILE NG66 BROADCASTING NG149 NG114 NG115 NG128	Public Mobile (22) Broadcast Radio (TV) (73) Auxiliary Broadcasting (74) Private Land Mobile (90)	
	512-608 BROADCASTING					5.291 5.298
	5.297	585-610 FIXED MOBILE BROADCASTING RADIONAVIGATION		608-614 RADIO ASTRONOMY US74 LAND MOBILE US350	NG115 NG128	Personal (95)
	608-614 RADIO ASTRONOMY Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)	5.149 5.305 5.306 5.307		US246		
	614-806 BROADCASTING Fixed Mobile	610-890 FIXED MOBILE 5.317A BROADCASTING		614-890	614-698 BROADCASTING NG149 NG115 NG128	Broadcast Radio (TV) (73) Auxiliary Broadcasting (74)
			698-764 FIXED MOBILE BROADCASTING NG159 NG115 NG128	Wireless Communications (27) Broadcast Radio (TV) (73) Auxiliary Broadcasting (74) Private Land Mobile (90)		
			764-776 FIXED MOBILE NG115 NG128 NG158 NG159	Auxiliary Broadcasting (74) Private Land Mobile (90)		

5.149 5.291A 5.294 5.296 5.300 5.302 5.304 5.306 5.311 5.312			776-794 FIXED MOBILE BROADCASTING	Wireless Communications (27) Broadcast Radio (TV) (73) Auxiliary Broadcast. (74) Private Land Mobile (90)
790-862 FIXED BROADCASTING	5.293 5.309 5.311		NG115 NG128 NG159	
	806-890 FIXED MOBILE BROADCASTING		794-806 FIXED MOBILE NG115 NG128 NG158 NG159	Auxiliary Broadcasting (74) Private Land Mobile (90)
			806-821 FIXED LAND MOBILE NG31	Public Mobile (22) Private Land Mobile (90)
			821-824 LAND MOBILE	Private Land Mobile (90)
			824-849 FIXED LAND MOBILE NG151	Public Mobile (22)
5.312 5.314 5.315 5.316 5.319 5.321			See next page for 849-894 MHz	See next page for 866-896 MHz
See next page for 862-890 MHz	5.317 5.318	5.149 5.305 5.306 5.307 5.311 5.320		

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous pages for 470-862 MHz	See previous pages for 614-890 MHz	See previous pages for 585-890 MHz	See previous pages for 614-890 MHz	See previous pages for 614-849 MHz	See previous pages for 614-849 MHz
				849-851 AERONAUTICAL MOBILE	Public Mobile (22)
				851-866 FIXED LAND MOBILE	Public Mobile (22) Private Land Mobile (90)
				NG31	
862-890 FIXED MOBILE except aeronautical mobile BROADCASTING 5.322				866-869 LAND MOBILE	Private Land Mobile (90)
5.319 5.323				869-894 FIXED LAND MOBILE	Public Mobile (22)
890-942 FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322 Radiolocation	890-902 FIXED MOBILE except aeronautical mobile 5.317A Radiolocation	890-942 FIXED MOBILE 5.317A BROADCASTING Radiolocation	890-902	US116 US268 NG151	
				894-896 AERONAUTICAL MOBILE	
				US116 US268	
				896-901 FIXED LAND MOBILE	Private Land Mobile (90)
				US116 US268	
				901-902 FIXED MOBILE	Personal Communications (24)
	5.318 5.325		US116 US268 G2	US116 US268	

902-928 FIXED Amateur Mobile except aeronautical mobile 5.325A Radiolocation 5.150 5.325 5.326	
928-942 FIXED MOBILE except aeronautical mobile 5.317A Radiolocation	

902-928 RADIOLOCATION G59 5.150 US215 US218 US267 US275 G11	902-928 5.150 US215 US218 US267 US275	ISM Equipment (18) Private Land Mobile (90) Amateur (97)
928-932	928-929 FIXED US116 US215 US268 NG120	Public Mobile (22) Private Land Mobile (90) Fixed Microwave (101)
	929-930 FIXED LAND MOBILE US116 US215 US268	Private Land Mobile (90)
	930-931 FIXED MOBILE US116 US215 US268	Personal Communications (24)
	931-932 FIXED LAND MOBILE US116 US215 US268 G2	Public Mobile (22)
932-935 FIXED US215 US268 G2	932-935 FIXED US215 US268 NG120	Public Mobile (22) Fixed Microwave (101)
935-940 US116 US215 US268 G2	935-940 FIXED LAND MOBILE US116 US215 US268	Private Land Mobile (90)
940-941 US116 US268 G2	940-941 FIXED MOBILE US116 US268	Personal Communications (24)
	See next page for 941-944 MHz	See next page for 941-944 MHz

5.323

5.325

5.327

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 890-942 MHz	See previous page for 928-942 MHz	See previous page for 890-942 MHz	941-944 FIXED	941-944 FIXED	Public Mobile (22) Fixed Microwave (101)
942-960 FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322	942-960 FIXED MOBILE 5.317A	942-960 FIXED MOBILE 5.317A BROADCASTING	US268 US301 US302 G2	US268 US301 US302 NG120	
5.323		5.320	944-960	944-960 FIXED NG120	Public Mobile (22) Auxiliary Broadcast. (74) Fixed Microwave (101)
960-1215 AERONAUTICAL RADIONAVIGATION 5.328			960-1215 AERONAUTICAL RADIONAVIGATION 5.328		Aviation (87)
5.328A			US224 US385		
1215-1240 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.329 5.329A SPACE RESEARCH (active)			1215-1240 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G56 RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) SPACE RESEARCH (active)	1215-1240 Earth exploration-satellite (active) Space research (active)	
5.330 5.331 5.332			5.332		
1240-1260 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.329 5.329A SPACE RESEARCH (active) Amateur			1240-1300 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G56 SPACE RESEARCH (active)	1240-1300 Earth exploration-satellite (active) Space research (active) Amateur	Amateur (97)
5.330 5.331 5.332 5.334 5.335					
1260-1300 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.329 5.329A SPACE RESEARCH (active) Amateur					
5.282 5.330 5.331 5.334 5.335 5.335A			5.332 5.334 5.335	5.282 5.334	

1300-1350 AERONAUTICAL RADIONAVIGATION 5.337 RADIOLOCATION RADIONAVIGATION-SATELLITE (Earth-to-space)		1300-1350 AERONAUTICAL RADIO- NAVIGATION 5.337 Radiolocation G2	1300-1350 AERONAUTICAL RADIO- NAVIGATION 5.337	Aviation (87)
5.149 5.337A		US342	US342	
1350-1400 FIXED MOBILE RADIOLOCATION	1350-1400 RADIOLOCATION	1350-1390 FIXED MOBILE RADIOLOCATION G2	1350-1390	
		5.334 5.339 US311 US342 G27 G114	5.334 5.339 US311 US342	
		1390-1395	1390-1392 FIXED MOBILE except aeronautical mobile FIXED-SATELLITE (Earth-to-space) US368	Wireless Communications (27)
			5.339 US311 US342 US351	
			1392-1395 FIXED MOBILE except aeronautical Mobile	
		5.339 US311 US342 US351	5.339 US311 US342 US351	
		1395-1400 LAND MOBILE US350		Personal (95)
5.149 5.338 5.339	5.149 5.334 5.339	5.339 US311 US342 US351		
1400-1427 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)		1400-1427 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive)		
5.340 5.341		5.341 US246		

1427-1610 MHz (UHF)				Page 43	
International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
1427-1429 SPACE OPERATION (Earth-to-space) FIXED MOBILE except aeronautical mobile 5.341			1427-1429.5 LAND MOBILE US350 5.341 US352	1427-1429.5 LAND MOBILE Fixed (telemetry) 5.341 US350 US352	Private Land Mobile (90) Personal (95)
1429-1452 FIXED MOBILE except aeronautical mobile	1429-1452 FIXED MOBILE 5.343		1429.5-1432 5.341 US350 US352	1429.5-1430 FIXED (telemetry) LAND MOBILE (telemetry) 5.341 US350 US352 1430-1432 FIXED (telemetry) LAND MOBILE (telemetry) FIXED-SATELLITE (space-to-Earth) US368 5.341 US350 US352	
5.341 5.342	5.341		1432-1435 5.341 US361	1432-1435 FIXED MOBILE except aeronautical mobile 5.341 US361	Wireless Communications (27)
1452-1492 FIXED MOBILE except aeronautical mobile BROADCASTING 5.345 5.347 BROADCASTING- SATELLITE 5.345 5.347 5.341 5.342	1452-1492 FIXED MOBILE 5.343 BROADCASTING 5.345 5.347 BROADCASTING-SATELLITE 5.345 5.347 5.341 5.344		1435-1525 MOBILE (aeronautical telemetry)		Aviation (87)
1492-1525 FIXED MOBILE except aeronautical mobile 5.341 5.342	1492-1525 FIXED MOBILE 5.343 MOBILE-SATELLITE (space-to-Earth) 5.348A 5.341 5.344 5.348	1492-1525 FIXED MOBILE 5.341 5.348A	5.341 US78		

1525-1530 SPACE OPERATION (space-to-Earth) FIXED MOBILE-SATELLITE (space-to-Earth) 5.351A Earth exploration-satellite Mobile except aeronautical mobile 5.349 5.341 5.342 5.350 5.351 5.352A 5.354	1525-1530 SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.351A Earth exploration-satellite Fixed Mobile 5.343 5.341 5.351 5.354	1525-1530 SPACE OPERATION (space-to-Earth) FIXED MOBILE-SATELLITE (space-to-Earth) 5.351A Earth exploration-satellite Mobile 5.349 5.341 5.351 5.352A 5.354	1525-1535 MOBILE-SATELLITE (space-to-Earth) US315 US380 5.341 5.351	Satellite Communications (25) Maritime (80)
1530-1535 SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space- to-Earth) 5.351A 5.353A Earth exploration-satellite Fixed Mobile except aeronautical mobile 5.341 5.342 5.351 5.354	1530-1535 SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.351A 5.353A Earth exploration-satellite Fixed Mobile 5.343 5.341 5.351 5.354			
1535-1559 MOBILE-SATELLITE (space-to-Earth) 5.351A 5.341 5.351 5.353A 5.354 5.355 5.356 5.357 5.357A 5.359 5.362A			1535-1559 MOBILE-SATELLITE (space-to-Earth) US308 US309 US315 US380 5.341 5.351 5.356	Satellite Communications (25) Maritime (80) Aviation (87)
1559-1610 AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.328B 5.329A 5.341 5.362B 5.362C 5.363			1559-1610 AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.341 US208 US260 US343	Aviation (87)

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
1610-1610.6 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION 5.341 5.355 5.359 5.363 5.364 5.366 5.367 5.368 5.369 5.371 5.372	1610-1610.6 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION RADIODETERMINATION- SATELLITE (Earth-to- space) 5.341 5.364 5.366 5.367 5.368 5.370 5.372	1610-1610.6 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION Radiodetermination-Satellite (Earth-to-space) 5.341 5.355 5.359 5.364 5.366 5.367 5.368 5.369 5.372	1610-1610.6 MOBILE-SATELLITE (Earth-to-space) US319 US380 AERONAUTICAL RADIONAVIGATION US260 RADIODETERMINATION-SATELLITE(Earth-to-space) 5.341 5.364 5.366 5.367 5.368 5.372 US208		Satellite Communications (25) Aviation (87)
1610.6-1613.8 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION 5.149 5.341 5.355 5.359 5.363 5.364 5.366 5.367 5.368 5.369 5.371 5.372	1610.6-1613.8 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION RADIODETERMINATION- SATELLITE (Earth-to- space) 5.149 5.341 5.364 5.366 5.367 5.368 5.370 5.372	1610.6-1613.8 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) 5.149 5.341 5.355 5.359 5.364 5.366 5.367 5.368 5.369 5.372	1610.6-1613.8 MOBILE-SATELLITE (Earth-to-space) US319 US380 RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION US260 RADIODETERMINATION-SATELLITE (Earth-to-space) 5.341 5.364 5.366 5.367 5.368 5.372 US208 US342		
1613.8-1626.5 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) 5.341 5.355 5.359 5.363 5.364 5.365 5.366 5.367 5.368 5.369 5.371 5.372	1613.8-1626.5 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION RADIODETERMINATION- SATELLITE (Earth-to-space) Mobile-satellite (space-to- Earth) 5.341 5.364 5.365 5.366 5.367 5.368 5.370 5.372	1613.8-1626.5 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to- Earth) Radiodetermination- satellite (Earth-to-space) 5.341 5.355 5.359 5.364 5.365 5.366 5.367 5.368 5.369 5.372	1613.8-1626.5 MOBILE-SATELLITE (Earth-to-space) US319 US380 AERONAUTICAL RADIONAVIGATION US260 RADIODETERMINATION-SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth) 5.341 5.364 5.365 5.366 5.367 5.368 5.372 US208		

1626.5-1660 MOBILE-SATELLITE (Earth-to-space) 5.351A 5.341 5.351 5.353A 5.354 5.355 5.357A 5.359 5.362A 5.374 5.375 5.376	1626.5-1660 MOBILE-SATELLITE (Earth-to-space) US308 US309 US315 US380 5.341 5.351 5.375	Satellite Communications (25) Maritime (80) Aviation (87)
1660-1660.5 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY 5.149 5.341 5.351 5.354 5.362A 5.376A	1660-1660.5 MOBILE-SATELLITE (Earth-to-space) US308 US309 US380 RADIO ASTRONOMY 5.341 5.351 US342	Satellite Communications (25) Aviation (87)
1660.5-1668.4 RADIO ASTRONOMY SPACE RESEARCH (passive) Fixed Mobile except aeronautical mobile 5.149 5.341 5.379 5.379A	1660.5-1668.4 RADIO ASTRONOMY US74 SPACE RESEARCH (passive) 5.341 US246	
1668.4-1670 METEOROLOGICAL AIDS FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY 5.149 5.341	1668.4-1670 METEOROLOGICAL AIDS (radiosonde) RADIO ASTRONOMY US74 5.341 US99 US342	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
1670-1675 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE 5.380			1670-1675	1670-1675 FIXED MOBILE except aeronautical mobile	Wireless Communications (27)
5.341			5.341 US211 US362	5.341 US211 US362	
1675-1690 METEOROLOGICAL AIDS FIXED METEOROLOGICAL- SATELLITE (space-to-Earth) MOBILE except aeronautical mobile	1675-1690 METEOROLOGICAL AIDS FIXED METEOROLOGICAL- SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space)	1675-1690 METEOROLOGICAL AIDS FIXED METEOROLOGICAL- SATELLITE (space-to-Earth) MOBILE except aeronautical mobile	1675-1700 METEOROLOGICAL AIDS (radiosonde) METEOROLOGICAL-SATELLITE (space-to-Earth)		
5.341	5.341 5.377	5.341			
1690-1700 METEOROLOGICAL AIDS METEOROLOGICAL- SATELLITE (space-to-Earth) Fixed Mobile except aeronautical mobile	1690-1700 METEOROLOGICAL AIDS METEOROLOGICAL- SATELLITE (space-to-Earth) MOBILE-SATELLITE (Earth-to-space)	1690-1700 METEOROLOGICAL AIDS METEOROLOGICAL- SATELLITE (space-to-Earth)			
5.289 5.341 5.382	5.289 5.341 5.377 5.381	5.289 5.341 5.381	5.289 5.341 US211		
1700-1710 FIXED METEOROLOGICAL- SATELLITE (space-to-Earth) MOBILE except aeronautical mobile	1700-1710 FIXED METEOROLOGICAL- SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space)	1700-1710 FIXED METEOROLOGICAL- SATELLITE (space-to-Earth) MOBILE except aeronautical mobile	1700-1710 FIXED G118 METEOROLOGICAL- SATELLITE (space-to-Earth)	1700-1710 METEOROLOGICAL- SATELLITE (space-to-Earth) Fixed	
5.289 5.341	5.289 5.341 5.377	5.289 5.341 5.384	5.289 5.341	5.289 5.341	
1710-1930 FIXED MOBILE 5.380 5.384A 5.388A			1710-1755	1710-1755 FIXED MOBILE	
			5.341 US311 US378	5.341 US311 US378 NG176	

5.149 5.341 5.385 5.386 5.387 5.388			1755-1850 FIXED MOBILE G42	1755-1850		
1930-1970 FIXED MOBILE 5.388A	1930-1970 FIXED MOBILE 5.388A Mobile-satellite (Earth-to-space)	1930-1970 FIXED MOBILE 5.388A	1850-2025	1850-2000 FIXED MOBILE	RF Devices (15) Personal Communications (24) Fixed Microwave (101)	
5.388	5.388	5.388				
1970-1980 FIXED MOBILE 5.388A						
5.388						
1980-2010 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.351A 5.388 5.389A 5.389B 5.389F				NG177		
2010-2025 FIXED MOBILE 5.388A	2010-2025 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space)	2010-2025 FIXED MOBILE 5.388A		2000-2020 MOBILE-SATELLITE (Earth-to-space) US380	Satellite Communications (25)	
5.388	5.388 5.389C 5.389D 5.389E 5.390	5.388		NG156		
2025-2110 SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) FIXED MOBILE 5.391 SPACE RESEARCH (Earth-to-space) (space-to-space)				2020-2025 FIXED MOBILE		
5.392				NG177		
			2025-2110 SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION- SATELLITE (Earth-to- space) (space-to-space) SPACE RESEARCH (Earth- to-space) (space-to-space)	2025-2110 FIXED NG118 MOBILE 5.391	TV Auxiliary Broadcasting (74F) Cable TV Relay (78) Local TV Transmission (101J)	
			5.391 5.392 US90 US222 US346 US347	5.392 US90 US222 US346 US347		

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
2110-2120 FIXED MOBILE 5.388A SPACE RESEARCH (deep space) (Earth-to-space)			2110-2120	2110-2155 FIXED MOBILE	Domestic Public Fixed (21) Public Mobile (22) Fixed Microwave (101)
5.388			US252		
2120-2160 FIXED MOBILE 5.388A	2120-2160 FIXED MOBILE 5.388A Mobile-satellite (space-to-Earth)	2120-2170 FIXED MOBILE 5.388A	2120-2200	US252	Domestic Public Fixed (21) Fixed Microwave (101)
5.388	5.388			2155-2160 FIXED	
2160-2170 FIXED MOBILE 5.388A	2160-2170 FIXED MOBILE 5.388A MOBILE-SATELLITE (space-to-Earth) 5.388 5.389C 5.389D 5.389E 5.390			2160-2180 FIXED NG153 MOBILE		Domestic Public Fixed (21) Public Mobile (22) Fixed Microwave (101)
5.388 5.392A		5.388	NG178		
2170-2200 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A				2180-2200 MOBILE-SATELLITE (space-to-Earth) US380	Satellite Communications (25)
5.388 5.389A 5.389F 5.392A				NG168	
2200-2290 SPACE OPERATION (space-to-Earth) (space-to-space) EARTH EXPLORATION-SATELLITE (space-to-Earth) (space-to-space) FIXED MOBILE 5.391 SPACE RESEARCH (space-to-Earth) (space-to-space)			2200-2290 SPACE OPERATION (space-to-Earth) (space-to-space) EARTH EXPLORATION-SATELLITE (space-to-Earth) (space-to-space) FIXED (line-of-sight only)	2200-2290	

			MOBILE (line-of-sight only including aeronautical telemetry, but excluding flight testing of manned aircraft) 5.391 SPACE RESEARCH (space-to-Earth) (space-to-space)		
5.392			5.392 US303	US303	
2290-2300 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (deep space) (space-to-Earth)			2290-2300 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (deep space) (space-to-Earth)	2290-2300 SPACE RESEARCH (deep space) (space-to-Earth)	
2300-2450 FIXED MOBILE Amateur Radiolocation	2300-2450 FIXED MOBILE RADIOLOCATION Amateur		2300-2305	2300-2305 Amateur	Amateur (97)
			G123		
			2305-2310	2305-2310 FIXED MOBILE except aeronautical mobile RADIOLOCATION Amateur	Wireless Communications (27) Amateur (97)
			US338 G123	US338	
			2310-2345 Fixed Mobile US339 Radiolocation G2 G120	2310-2320 FIXED MOBILE US339 RADIOLOCATION BROADCASTING-SATELLITE 5.396 US327	Wireless Communications (27) Aviation (87)
		US327			
		2345-2360 Fixed Radiolocation G2 G120	2320-2345 BROADCASTING-SATELLITE 5.396 US327	Satellite Communications (25)	
		US327			
5.150 5.282 5.395	5.150 5.282 5.393 5.394 5.396	See next page for 2345-2450 MHz	See next page for 2345-2450 MHz	See next page for 2345-2450 MHz	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 2300-2450 MHz			2345-2360 Fixed Mobile US339 Radiolocation G2 G120 US327	2345-2360 FIXED MOBILE US339 RADIOLOCATION BROADCASTING- SATELLITE 5.396 US327	Wireless Communications (27) Aviation (87)
			2360-2385 MOBILE US276 RADIOLOCATION G2 G120 Fixed	2360-2385 MOBILE US276	Aviation (87)
			2385-2390 US363	2385-2390 FIXED MOBILE NG174 US363	Wireless Communications (27)
			2390-2400 G122	2390-2400 AMATEUR	Amateur (97)
			2400-2402 5.150 G123 2402-2417 5.150 G122	2400-2417 AMATEUR 5.150 5.282	ISM Equipment (18) Amateur (97)
			2417-2450 Radiolocation G2 5.150 G124	2417-2450 Amateur 5.150 5.282	
2450-2483.5 FIXED MOBILE Radiolocation 5.150 5.397	2450-2483.5 FIXED MOBILE RADIOLOCATION 5.150 5.394		2450-2483.5 5.150 US41	2450-2483.5 FIXED MOBILE Radiolocation 5.150 US41	ISM Equipment (18) Private Land Mobile (90) Fixed Microwave (101)

2483.5-2500 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A Radiolocation 5.150 5.371 5.397 5.398 5.399 5.400 5.402	2483.5-2500 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A RADIOLOCATION RADIODETERMINATION- SATELLITE (space-to- Earth) 5.398 5.150 5.402	2483.5-2500 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A RADIOLOCATION Radiodetermination-satellite (space-to-Earth) 5.398 5.150 5.400 5.402	2483.5-2500 MOBILE-SATELLITE (space-to-Earth) US319 US380 RADIODETERMINATION- SATELLITE (space-to- Earth) 5.398 5.150 5.402 US41	2483.5-2500 MOBILE-SATELLITE (space-to-Earth) US319 US380 RADIODETERMINATION- SATELLITE (space-to- Earth) 5.398 5.150 5.402 US41 NG147	ISM Equipment (18) Satellite Communications (25) Private Land Mobile (90) Fixed Microwave (101)
2500-2520 FIXED 5.409 5.410 5.411 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (space- to-Earth) 5.403 5.351A 5.405 5.407 5.412 5.414	2500-2520 FIXED 5.409 5.411 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (space-to-Earth) 5.403 5.351A 5.404 5.407 5.414 5.415A		2500-2655	2500-2655 FIXED US205 MOBILE except aeronautical mobile	Domestic Public Fixed (21) Instructional TV Fixed (74)
2520-2655 FIXED 5.409 5.410 5.411 MOBILE except aeronautical mobile 5.384A BROADCASTING- SATELLITE 5.413 5.416 5.339 5.403 5.405 5.412 5.418 5.418B 5.418C	2520-2655 FIXED 5.409 5.411 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A BROADCASTING- SATELLITE 5.413 5.416 5.339 5.403 5.418B 5.418C	2520-2535 FIXED 5.409 5.411 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A BROADCASTING- SATELLITE 5.413 5.416 5.403 5.415A 2535-2655 FIXED 5.409 5.411 MOBILE except aeronautical mobile 5.384A BROADCASTING- SATELLITE 5.413 5.416 5.339 5.418 5.418A 5.418B 5.418C	5.339 US205	5.339	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
2655-2670 FIXED 5.409 5.410 5.411 MOBILE except aeronautical mobile 5.384A BROADCASTING SATELLITE 5.413 5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive)	2655-2670 FIXED 5.409 5.411 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A BROADCASTING- SATELLITE 5.413 5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive)	2655-2670 FIXED 5.409 5.411 FIXED-SATELLITE (Earth-to-space) 5.415 MOBILE except aeronautical mobile 5.384A BROADCASTING- SATELLITE 5.413 5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive)	2655-2690 Earth exploration-satellite (passive) Radio astronomy Space research (passive)	2655-2690 FIXED US205 MOBILE except aeronautical mobile Earth exploration-satellite (passive) Radio astronomy Space research (passive)	Domestic Public Fixed (21) Instructional TV Fixed (74)
5.149 5.412 5.420	5.149 5.420	5.149 5.420			
2670-2690 FIXED 5.409 5.410 5.411 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (passive) Radio astronomy Space research (passive)	2670-2690 FIXED 5.409 5.411 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (passive) Radio astronomy Space research (passive)	2670-2690 FIXED 5.409 5.411 FIXED-SATELLITE (Earth-to-space) 5.415 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (passive) Radio astronomy Space research (passive)			
5.149 5.419 5.420	5.149 5.419 5.420	5.149 5.419 5.420 5.420A	US205		
2690-2700 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)			2690-2700 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive)		
5.340 5.421 5.422			US246		
2700-2900 AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation			2700-2900 AERONAUTICAL RADIO- NAVIGATION 5.337 METEOROLOGICAL AIDS Radiolocation G2	2700-2900	
5.423 5.424			5.423 US18 G15	5.423 US18	

2900-3100 RADIONAVIGATION 5.426 Radiolocation			2900-3100 MARITIME RADIONAVIGATION Radiolocation G56	2900-3100 MARITIME RADIONAVIGATION Radiolocation US44	Maritime (80) Private Land Mobile (90)
5.425 5.427			5.427 US44 US316	5.5427 US316	
3100-3300 RADIOLOCATION Earth exploration-satellite (active) Space research (active)			3100-3300 RADIOLOCATION G59 Earth exploration-satellite (active) Space research (active)	3100-3300 Radiolocation Earth exploration-satellite (active) Space research (active)	Private Land Mobile (90)
5.149 5.428			US342	US342	
3300-3400 RADIOLOCATION	3300-3400 RADIOLOCATION Amateur Fixed Mobile	3300-3400 RADIOLOCATION Amateur	3300-3500 RADIOLOCATION US108 G31	3300-3500 Amateur Radiolocation US108	Private Land Mobile (90) Amateur (97)
5.149 5.429 5.430	5.149 5.430	5.149 5.429			
3400-3600 FIXED FIXED-SATELLITE (space-to-Earth) Mobile Radiolocation	3400-3500 FIXED FIXED-SATELLITE (space-to-Earth) Amateur Mobile Radiolocation 5.433		US342	US342 5.282	Private Land Mobile (90)
5.431	5.282 5.432				
3600-4200 FIXED FIXED-SATELLITE (space-to-Earth) Mobile	3500-3700 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation 5.433		3500-3650 RADIOLOCATION G59 AERONAUTICAL RADIONAVIGATION (ground-based) G110	3500-3600 Radiolocation	Private Land Mobile (90)
			US245	3600-3650 FIXED-SATELLITE (space-to-Earth) US245 Radiolocation	
			3650-3700	3650-3700 FIXED FIXED-SATELLITE (space-to-Earth) NG169 MOBILE except aeronautical mobile NG170	
	5.435		US245 US348 US349	US245 US348 US349	
	See next page for 3700-4200 MHz		See next page for 3700-4200 MHz	See next page for 3700-4200 MHz	See next page for 3700-4200 MHz

International Table			United States Table		FCC Rule Part(s)
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See previous page for 3600-4200 MHz	3700-4200 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile		3700-4200	3700-4200 FIXED NG41 FIXED-SATELLITE (space-to-Earth)	International Fixed (23) Satellite Communications (25) Fixed Microwave (101)
4200-4400 AERONAUTICAL RADIONAVIGATION 5.438			4200-4400 AERONAUTICAL RADIONAVIGATION		Aviation (87)
5.437 5.439 5.440			5.440 US261		
4400-4500 FIXED MOBILE			4400-4500 FIXED MOBILE	4400-4500	
4500-4800 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE			4500-4800 FIXED MOBILE US245	4500-4800 FIXED-SATELLITE (space-to-Earth) 5.441 US245	
4800-4990 FIXED MOBILE 5.442 Radio astronomy			4800-4940 FIXED MOBILE US203 US342	4800-4940 US203 US342	
5.149 5.339 5.443			4940-4990	4940-4990 FIXED MOBILE except aeronautical mobile	Private Land Mobile (90) Fixed Microwave (101)
4990-5000 FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY Space research (passive)			5.339 US311 US342 G122	5.339 US311 US342	
5.149			4990-5000 RADIO ASTRONOMY US74 Space research (passive)		
5000-5150 AERONAUTICAL RADIONAVIGATION			5000-5250 AERONAUTICAL RADIO- NAVIGATION US260	5000-5150 AERONAUTICAL RADIO- NAVIGATION US260 5.367 5.444A US211 US344 US370	Satellite Communications (25) Aviation (87)
5.367 5.443A 5.443B 5.444 5.444A					

5150-5250 AERONAUTICAL RADIONAVIGATION FIXED-SATELLITE (Earth-to-space) 5.447A		5150-5250 AERONAUTICAL RADIO- NAVIGATION US260 FIXED-SATELLITE (Earth- to-space) 5.447A US344	Satellite Communications (25) Aviation (87)
5.446 5.447 5.447B 5.447C	5.367 US211 US307 US344 US370	5.447C US211 US307	
5250-5255 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH 5.447D	5250-5255 EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active) 5.447D	5250-5255 Earth exploration-satellite (active) Radiolocation Space research	Private Land Mobile (90)
5.448 5.448A			
5255-5350 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active)	5255-5350 EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active)	5255-5350 Earth exploration-satellite (active) Radiolocation Space research (active)	
5.448 5.448A			
5350-5460 EARTH EXPLORATION-SATELLITE (active) 5.448B AERONAUTICAL RADIONAVIGATION 5.449 Radiolocation	5350-5460 EARTH EXPLORATION- SATELLITE (active) 5.448B AERONAUTICAL RADIO- NAVIGATION 5.449 RADIOLOCATION G56	5350-5460 AERONAUTICAL RADIO- NAVIGATION 5.449 Earth exploration-satellite (active) Radiolocation	Aviation (87) Private Land Mobile (90)
5460-5470 RADIONAVIGATION 5.449 Radiolocation	5460-5470 RADIONAVIGATION 5.449 Radiolocation G56	5460-5470 RADIONAVIGATION 5.449 Radiolocation	Private Land Mobile (90)
	US49 US65	US49 US65	
5470-5650 MARITIME RADIONAVIGATION Radiolocation	5470-5600 MARITIME RADIONAVIGATION Radiolocation G56	5470-5600 MARITIME RADIONAVIGATION Radiolocation	Maritime (80) Private land Mobile (90)
	US50 US65	US50 US65	
	5600-5650 MARITIME RADIONAVIGATION METEOROLOGICAL AIDS Radiolocation US51 G56	5600-5650 MARITIME RADIONAVIGATION METEOROLOGICAL AIDS Radiolocation US51	
5.450 5.451 5.452	5.452 US65	5.452 US65	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
5650-5725 RADIOLOCATION Amateur Space research (deep space) 5.282 5.451 5.453 5.454 5.455			5650-5925 RADIOLOCATION G2	5650-5830 Amateur	ISM Equipment (18) Amateur (97)
5725-5830 FIXED-SATELLITE (Earth-to-space) RADIOLOCATION Amateur 5.150 5.451 5.453 5.455 5.456	5725-5830 RADIOLOCATION Amateur 5.150 5.453 5.455			5.150 5.282	
5830-5850 FIXED-SATELLITE (Earth-to-space) RADIOLOCATION Amateur Amateur-satellite (space-to-Earth) 5.150 5.451 5.453 5.455 5.456	5830-5850 RADIOLOCATION Amateur Amateur-satellite (space-to-Earth) 5.150 5.453 5.455			5830-5850 Amateur Amateur-satellite (space-to-Earth) 5.150	
5850-5925 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE 5.150	5850-5925 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE Amateur Radiolocation 5.150	5850-5925 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE Radiolocation 5.150	5.150 US245	5850-5925 FIXED-SATELLITE (Earth-to-space) US245 MOBILE NG160 Amateur 5.150	ISM Equipment (18) Private Land Mobile (90) Amateur (97)
5925-6700 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE			5925-6425	5925-6425 FIXED NG41 FIXED-SATELLITE (Earth-to-space)	International Fixed (23) Satellite Communications (25) Fixed Microwave (101)
			6425-6525 5.440 5.458	6425-6525 FIXED-SATELLITE (Earth-to-space) MOBILE 5.440 5.458	Auxiliary Broadcasting (74) Cable TV Relay (78) Fixed Microwave (101)

5.149 5.440 5.458	6525-6700 FIXED FIXED-SATELLITE (Earth-to-space) 5.458 US342	6525-6700 FIXED FIXED-SATELLITE (Earth-to-space) 5.458 US342	Satellite Communications (25) Fixed Microwave (101)
6700-7075 FIXED FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.441 MOBILE	6700-7125	6700-6875 FIXED FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.441 5.458 5.458A 5.458B	
5.458 5.458A 5.458B 5.458C		6875-7025 FIXED NG118 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.441 MOBILE NG171 5.458 5.458A 5.458B	Satellite Communications (25) Auxiliary Broadcasting (74) Cable TV Relay (78)
7075-7250 FIXED MOBILE		7025-7075 FIXED NG118 FIXED-SATELLITE (Earth-to-space) NG172 MOBILE NG171 5.458 5.458A 5.458B	
7075-7250 FIXED MOBILE	5.458	7075-7125 FIXED NG118 MOBILE NG171 5.458	Auxiliary Broadcasting (74) Cable TV Relay (78)
	7125-7190 FIXED 5.458 US252 G116	7125-7190 5.458 US252	
5.458 5.459 5.460	7190-7235 FIXED SPACE RESEARCH (Earth-to-space) 5.458 7235-7250 FIXED 5.458	7190-7250 5.458	

International Table			United States Table		FCC Rule Part(s)
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7250-7300 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE			7250-7300 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Fixed	7250-8025	
5.461			G117		
7300-7450 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile			7300-7450 FIXED FIXED-SATELLITE (space-to-Earth) Mobile-satellite (space-to-Earth)		
5.461			G117		
7450-7550 FIXED FIXED-SATELLITE (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile			7450-7550 FIXED FIXED-SATELLITE (space-to-Earth) METEOROLOGICAL- SATELLITE (space-to-Earth) Mobile-satellite (space-to-Earth)		
5.461A			G104 G117		
7550-7750 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile			7550-7750 FIXED FIXED-SATELLITE (space-to-Earth) Mobile-satellite (space-to-Earth)		
			G117		
7750-7850 FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) 5.461B MOBILE except aeronautical mobile			7750-7850 FIXED METEOROLOGICAL- SATELLITE (space-to-Earth) 5.461B		
7850-7900 FIXED MOBILE except aeronautical mobile			7850-7900 FIXED		

7900-8025 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE	7900-8025 FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) Fixed		
5.461 8025-8175 EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) MOBILE 5.463	G117 8025-8175 EARTH EXPLORATION- SATELLITE (space-to- Earth) FIXED FIXED-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to- space) (no airborne transmissions)	8025-8215	
5.462A 8175-8215 EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) MOBILE 5.463	US258 G117 8175-8215 EARTH EXPLORATION- SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) METEOROLOGICAL- SATELLITE (Earth-to-space) Mobile-satellite (Earth-to- space) (no airborne transmissions)		
5.462A	US258 G104 G117	US258	

International Table			United States Table		FCC Rule Part(s)
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8215-8400 EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) MOBILE 5.463			8215-8400 EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to-space) (no airborne transmissions)	8215-8400	
5.462A			US258 G117	US258	
8400-8500 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (space-to-Earth) 5.465 5.466			8400-8450 FIXED SPACE RESEARCH (space-to-Earth) (deep space only)	8400-8450 Space research (space-to-Earth) (deep space only)	
5.467			8450-8500 FIXED SPACE RESEARCH (space-to-Earth)	8450-8500 SPACE RESEARCH (space-to-Earth)	
8500-8550 RADIOLOCATION			8500-8550 RADIOLOCATION G59	8500-8550 Radiolocation	
5.468 5.469					
8550-8650 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active)			8550-8650 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active)	8550-8650 Earth exploration-satellite (active) Radiolocation Space research (active)	
5.468 5.469 5.469A					
8650-8750 RADIOLOCATION			8650-9000 RADIOLOCATION G59	8650-9000 Radiolocation	
5.468 5.469					
8750-8850 RADIOLOCATION AERONAUTICAL RADIONAVIGATION 5.470					
5.471					

8850-9000 RADIOLOCATION MARITIME RADIONAVIGATION 5.472			
5.473	US53	US53	
9000-9200 AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation	9000-9200 AERONAUTICAL RADIO- NAVIGATION 5.337 Radiolocation G2	9000-9200 AERONAUTICAL RADIO- NAVIGATION 5.337 Radiolocation	Aviation (87)
5.471	US48 G19	US48	
9200-9300 RADIOLOCATION MARITIME RADIONAVIGATION 5.472	9200-9300 MARITIME RADIO- NAVIGATION 5.472 Radiolocation US110 G59	9200-9300 MARITIME RADIO- NAVIGATION 5.472 Radiolocation US110	
5.473 5.474	5.474	5.474	
9300-9500 RADIONAVIGATION 5.476 Radiolocation	9300-9500 RADIONAVIGATION 5.476 US66 Radiolocation US51 G56 Meteorological aids	9300-9500 RADIONAVIGATION 5.476 US66 Radiolocation US51 Meteorological aids	
5.427 5.474 5.475	5.427 5.474 US67 US71	5.427 5.474 US67 US71	
9500-9800 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION SPACE RESEARCH (active)	9500-9800 EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active)	9500-9800 Earth exploration- satellite (active) Radiolocation Space research (active)	
5.476A			
9800-10000 RADIOLOCATION Fixed	9800-10000 RADIOLOCATION	9800-10000 Radiolocation	
5.477 5.478 5.479	5.479	5.479	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
10-10.45 FIXED MOBILE RADIOLOCATION Amateur	10-10.45 RADIOLOCATION Amateur	10-10.45 FIXED MOBILE RADIOLOCATION Amateur	10-10.45 RADIOLOCATION	10-10.45 Radiolocation Amateur	Private Land Mobile (90) Amateur (97)
5.479	5.479 5.480	5.479	5.479 US58 US108 G32	5.479 US58 US108 NG42	
10.45-10.5 RADIOLOCATION Amateur Amateur-satellite			10.45-10.5 RADIOLOCATION	10.45-10.5 Radiolocation Amateur Amateur-satellite	
5.481			US58 US108 G32	US58 US108 NG42 NG134	
10.5-10.55 FIXED MOBILE Radiolocation	10.5-10.55 FIXED MOBILE RADIOLOCATION		10.5-10.55 RADIOLOCATION		Private Land Mobile (90)
			US59		
10.55-10.6 FIXED MOBILE except aeronautical mobile Radiolocation			10.55-10.6	10.55-10.6 FIXED	Fixed Microwave (101)
10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) Radiolocation			10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive)	10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) FIXED US265 SPACE RESEARCH (passive)	
5.149 5.482			US265 US277	US277	
10.68-10.7 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)			10.68-10.7 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive)		
5.340 5.483			US246 US355		

10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 5.484A (Earth-to-space) 5.484 MOBILE except aeronautical mobile	10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 5.484A MOBILE except aeronautical mobile		10.7-11.7 US211	10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 US211 NG104 US355	Satellite Communications (25) Fixed Microwave (101)
11.7-12.5 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE	11.7-12.1 FIXED 5.486 FIXED-SATELLITE (space-to-Earth) 5.484A Mobile except aeronautical mobile 5.485 5.488	11.7-12.2 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE	11.7-12.1 5.486 12.1-12.2	11.7-12.2 FIXED-SATELLITE (space-to-Earth) NG143 NG145 Mobile except aeronautical mobile 5.486 5.488	
5.487 5.487A 5.492	12.1-12.2 FIXED-SATELLITE (space-to-Earth) 5.484A 5.485 5.488 5.489	5.487 5.487A 5.492	12.2-12.7	12.2-12.7 FIXED BROADCASTING-SATELLITE	
12.5-12.75 FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space)	12.2-12.7 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE	12.2-12.5 FIXED MOBILE except aeronautical mobile BROADCASTING	5.490	5.487A 5.488 5.490	
5.494 5.495 5.496	5.487A 5.488 5.490 5.492 See next page for 12.7-12.75 GHz	5.484A 5.487 5.491 12.5-12.75 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A MOBILE except aeronautical mobile BROADCASTING-SATELLITE 5.493	See next page for 12.7-12.75 GHz		See next page for 12.7-12.75 GHz

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See previous page for 12.5-12.75 GHz	12.7-12.75 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE except aeronautical mobile	See previous page for 12.5-12.75 GHz	12.7-12.75	12.7-12.75 FIXED NG118 FIXED-SATELLITE (Earth-to-space) MOBILE NG53	Satellite Communications (25) Auxiliary Broadcasting (74) Cable TV Relay (78) Fixed Microwave (101)
12.75-13.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.441 MOBILE Space research (deep space) (space-to-Earth)			12.75-13.25 US251	12.75-13.25 FIXED NG118 FIXED-SATELLITE (Earth-to-space) 5.441 NG104 MOBILE US251 NG53	
13.25-13.4 EARTH EXPLORATION-SATELLITE (active) AERONAUTICAL RADIONAVIGATION 5.497 SPACE RESEARCH (active)			13.25-13.4 EARTH EXPLORATION-SATELLITE (active) AERONAUTICAL RADIO-NAVIGATION 5.497 SPACE RESEARCH (active) 5.498A	13.25-13.4 AERONAUTICAL RADIO-NAVIGATION 5.497 Earth exploration-satellite (active) Space research (active)	Aviation (87)
5.498A 5.499					
13.4-13.75 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH 5.501A Standard frequency and time signal-satellite (Earth-to-space)			13.4-13.75 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active) 5.501A Standard frequency and time signal-satellite (Earth-to-space) 5.501B	13.4-13.75 Earth exploration-satellite (active) Radiolocation Space research Standard frequency and time signal-satellite (Earth-to-space)	Private Land Mobile (90)
5.499 5.500 5.501 5.501B					
13.75-14 FIXED-SATELLITE (Earth-to-space) 5.484A RADIOLOCATION Standard frequency and time signal-satellite (Earth-to-space) Space research			13.75-14 RADIOLOCATION G59 Standard frequency and time signal-satellite (Earth-to-space) Space research US337 5.503A US356 US357	13.75-14 FIXED-SATELLITE (Earth-to-space) US337 Radiolocation Standard frequency and time signal-satellite (Earth-to-space) Space research	Satellite Communications (25) Private Land Mobile (90)
5.499 5.500 5.501 5.502 5.503 5.503A					

14-14.25 FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 5.457A 5.506B 5.457B RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) 5.504C 5.506A Space research 5.504A 5.505			14-14.2 RADIONAVIGATION US292 Space research	14-14.2 FIXED-SATELLITE (Earth-to-space) RADIONAVIGATION US292 Mobile-satellite (Earth-to-space) Space research	Satellite Communications (25) Maritime (80) Aviation (87)
14.25-14.3 FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 5.457A 5.457B 5.506B RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) 5.506A 5.508A Space research 5.504A 5.505 5.508 5.509			14.2-14.4	14.2-14.4 FIXED-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to-space) Mobile except aeronautical mobile	Satellite Communications (25) Fixed Microwave (101)
14.3-14.4 FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 5.506B 5.457A 5.457B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.506A 5.509A Radionavigation-satellite 5.504A	14.3-14.4 FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 5.457A 5.506B Mobile-satellite (Earth-to-space) 5.506A Radionavigation-satellite 5.504A	14.3-14.4 FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 5.457A 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.506A 5.509A Radionavigation-satellite 5.504A			
14.4-14.47 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.506A 5.509A Space research (space-to-Earth) 5.504A			14.4-14.47 Fixed Mobile	14.4-14.47 FIXED-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to-space)	Satellite Communications (25)
14.47-14.5 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Radio astronomy 5.149 5.504A			14.47-14.5 Fixed Mobile US203 US342	14.47-14.5 FIXED-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to-space)	US203 US342

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14.5-14.8 FIXED FIXED-SATELLITE (Earth-to-space) 5.510 MOBILE Space research			14.5-14.7145 FIXED Mobile Space research	14.5-14.7145	
14.8-15.35 FIXED MOBILE Space research			14.7145-15.1365 MOBILE Fixed Space research US310	14.7145-15.1365 US310	
5.339			15.1365-15.35 FIXED Mobile Space research 5.339 US211	15.1365-15.35 5.339 US211	
15.35-15.4 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) 5.340 5.511			15.35-15.4 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US246		
15.4-15.43 AERONAUTICAL RADIONAVIGATION 5.511D			15.4-15.43 AERONAUTICAL RADIONAVIGATION US260 US211		Aviation (87)
15.43-15.63 FIXED SATELLITE (Earth-to-space) 5.511A AERONAUTICAL RADIONAVIGATION 5.511C			15.43-15.63 AERONAUTICAL RADIO- NAVIGATION US260 5.511C US211 US359	15.43-15.63 FIXED SATELLITE (Earth-to-space) AERONAUTICAL RADIO- NAVIGATION US260 5.511C US211 US359	Satellite Communications (25) Aviation (87)
15.63-15.7 AERONAUTICAL RADIONAVIGATION 5.511D			15.63-15.7 AERONAUTICAL RADIONAVIGATION US260 US211		Aviation (87)
15.7-16.6 RADIOLOCATION 5.512 5.513			15.7-16.6 RADIOLOCATION G59	15.7-17.2 Radiolocation	Private Land Mobile (90)

16.6-17.1 RADIOLOCATION Space research (deep space) (Earth-to-space) 5.512 5.513			16.6-17.1 RADIOLOCATION G59 Space research (deep space) (Earth-to-space)		
17.1-17.2 RADIOLOCATION 5.512 5.513			17.1-17.2 RADIOLOCATION G59		
17.2-17.3 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) 5.512 5.513 5.513A			17.2-17.3 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active)	17.2-17.3 Radiolocation Earth exploration-satellite (active) Space research (active)	
17.3-17.7 FIXED-SATELLITE (Earth-to-space) 5.516 Radiolocation 5.514	17.3-17.7 FIXED-SATELLITE (Earth-to-space) 5.516 BROADCASTING-SATELLITE Radiolocation 5.514 5.515 5.517	17.3-17.7 FIXED-SATELLITE (Earth-to-space) 5.516 Radiolocation 5.514	17.3-17.7 Radiolocation US259 G59	17.3-17.7 FIXED-SATELLITE (Earth-to-space) US271 BROADCASTING-SATELLITE NG163 NG167 US259	Satellite Communications (25)
17.7-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE	17.7-17.8 FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.516 BROADCASTING-SATELLITE Mobile 5.518 5.515 5.517	17.7-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE	17.7-17.8	17.7-17.8 FIXED FIXED-SATELLITE (Earth-to-space) US271 NG144	Satellite Communications (25) Auxiliary Broadcasting (74) Cable TV Relay (78) Fixed Microwave (101)
	17.8-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE		17.8-18.3 FIXED-SATELLITE (space-to-Earth) G117	17.8-18.3 FIXED	Auxiliary Broadcasting (74) Cable TV Relay (78) Fixed Microwave (101)
18.1-18.4 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.520 MOBILE 5.519 5.521			5.519 US334 See next page for 18.3-18.6 GHz	5.519 US334 NG144 See next page for 18.3-18.58 GHz	See next page for 18.3-18.58 GHz

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 18.1-18.4 GHz			18.3-18.6 FIXED-SATELLITE (space-to-Earth) G117	18.3-18.6 FIXED-SATELLITE (space-to-Earth) NG164	Satellite Communications (25)
18.4-18.6 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A MOBILE			US334	US334 NG144	
18.6-18.8 EARTH EXPLORATION- SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B MOBILE except aeronautical mobile Space research (passive)	18.6-18.8 EARTH EXPLORATION- SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B MOBILE except aeronautical mobile SPACE RESEARCH (passive)	18.6-18.8 EARTH EXPLORATION- SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B MOBILE except aeronautical mobile Space research (passive)	18.6-18.8 EARTH EXPLORATION- SATELLITE (passive) FIXED-SATELLITE (space-to-Earth) US255 G117 SPACE RESEARCH (passive)	18.6-18.8 EARTH EXPLORATION- SATELLITE (passive) FIXED-SATELLITE (space-to-Earth) US255 NG164 SPACE RESEARCH (passive)	
5.522A 5.522C	5.522A	5.522A 5.522C	US254 US334	US254 US334 NG144	
18.8-19.3 FIXED FIXED-SATELLITE (space-to-Earth) 5.523A MOBILE			18.8-20.2 FIXED-SATELLITE (space-to-Earth) G117	18.8-19.3 FIXED-SATELLITE (space-to-Earth) NG165 US334 NG144	
19.3-19.7 FIXED FIXED-SATELLITE (space-to-Earth) (Earth-space) 5.523B 5.523C 5.523D 5.523E MOBILE				19.3-19.7 FIXED FIXED-SATELLITE (space-to-Earth) NG166 US334 NG144	Satellite Communications (25) Auxiliary Broadcast. (74) Cable TV Relay (78) Fixed Microwave (101)
19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A Mobile-satellite (space-to-Earth)	19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A MOBILE-SATELLITE (space-to-Earth)	19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A Mobile-satellite (space-to-Earth)		19.7-20.1 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth)	Satellite Communications (25)
5.524	5.524 5.525 5.526 5.527 5.528 5.529	5.524		5.525 5.526 5.527 5.528 5.529 US334	

20.1-20.2 FIXED-SATELLITE (space-to-Earth) 5.484A MOBILE-SATELLITE (space-to-Earth)				20.1-20.2 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.525 5.526 5.527 5.528 US334	
5.524 5.525 5.526 5.527 5.528			US334		
20.2-21.2 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard frequency and time signal-satellite (space-to-Earth)			20.2-21.2 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard frequency and time signal-satellite (space-to-Earth)	20.2-21.2 Standard frequency and time signal-satellite (space-to-Earth)	
5.524			G117		
21.2-21.4 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive)			21.2-21.4 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) US263		Fixed Microwave (101)
21.4-22 FIXED MOBILE BROADCASTING- SATELLITE 5.530	21.4-22 FIXED MOBILE	21.4-22 FIXED MOBILE BROADCASTING- SATELLITE 5.530 5.531	21.4-22 FIXED MOBILE		
22-22.21 FIXED MOBILE except aeronautical mobile 5.149			22-22.21 FIXED MOBILE except aeronautical mobile US342		
22.21-22.5 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) 5.149 5.532			22.21-22.5 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) US342 US263		

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
22.5-22.55 FIXED MOBILE			22.5-22.55 FIXED MOBILE US211		Fixed Microwave (101)
22.55-23.55 FIXED INTER-SATELLITE MOBILE			22.55-23.55 FIXED INTER-SATELLITE US278 MOBILE		Satellite Communications (25) Fixed Microwave (101)
5.149			US342		
23.55-23.6 FIXED MOBILE			23.55-23.6 FIXED MOBILE		Fixed Microwave (101)
23.6-24 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)			23.6-24 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive)		
5.340			US246		
24-24.05 AMATEUR AMATEUR-SATELLITE			24-24.05	24-24.05 AMATEUR AMATEUR-SATELLITE	ISM Equipment (18) Amateur (97)
5.150			5.150 US211	5.150 US211	
24.05-24.25 RADIOLOCATION Amateur Earth exploration-satellite (active)			24.05-24.25 RADIOLOCATION G59 Earth exploration-satellite (active)	24.05-24.25 Amateur Earth exploration-satellite (active) Radiolocation	ISM Equipment (18) Private Land Mobile (90) Amateur (97)
5.150			5.150	5.150	
24.25-24.45 FIXED	24.25-24.45 RADIONAVIGATION	24.25-24.45 RADIONAVIGATION FIXED MOBILE	24.25-24.45	24.25-24.45 FIXED	Fixed Microwave (101)

24.45-24.75 FIXED INTER-SATELLITE	24.45-24.65 INTER-SATELLITE RADIONAVIGATION 5.533	24.45-24.65 FIXED INTER-SATELLITE MOBILE RADIONAVIGATION 5.533	24.45-24.65 INTER-SATELLITE RADIONAVIGATION 5.533		Satellite Communications (25)
	24.65-24.75 INTER-SATELLITE RADIOLOCATION- SATELLITE (Earth-to-space)	24.65-24.75 FIXED INTER-SATELLITE MOBILE 5.533 5.534	24.65-24.75 INTER-SATELLITE RADIOLOCATION-SATELLITE (Earth-to-space)		
24.75-25.25 FIXED	24.75-25.25 FIXED-SATELLITE (Earth-to-space) 5.535	24.75-25.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.535 MOBILE 5.534	24.75-25.05 RADIONAVIGATION	24.75-25.05 FIXED-SATELLITE (Earth-to-space) NG167 RADIONAVIGATION	Satellite Communications (25) Aviation (87)
			25.05-25.25	25.05-25.25 FIXED-SATELLITE (Earth-to-space) NG167 FIXED	Satellite Communications (25) Fixed Microwave (101)
25.25-25.5 FIXED INTER-SATELLITE 5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)			25.25-25.5 FIXED INTER-SATELLITE 5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)	25.25-25.5 Earth exploration-satellite (space-to-space) Standard frequency and time signal-satellite (Earth-to-space)	
25.5-27 EARTH EXPLORATION-SATELLITE (space-to-Earth) 5.536A 5.536B FIXED INTER-SATELLITE 5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)			25.5-27 EARTH EXPLORATION- SATELLITE (space-to- Earth) 5.536A FIXED INTER-SATELLITE 5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)	25.5-27 Earth exploration-satellite (space-to-Earth) 5.536A (space-to-space) Standard frequency and time signal-satellite (Earth-to-space)	
27-27.5 FIXED INTER-SATELLITE 5.536 MOBILE	27-27.5 FIXED FIXED-SATELLITE (Earth-to-space) INTER-SATELLITE 5.536 5.537 MOBILE		27-27.5 FIXED INTER-SATELLITE 5.536 MOBILE	27-27.5 Earth exploration-satellite (space-to-space)	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
27.5-28.5 FIXED 5.537A FIXED-SATELLITE (Earth-to-space) 5.484A 5.539 MOBILE 5.538 5.540			27.5-30	27.5-29.5 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE	Satellite Communications (25) Fixed Microwave (101)
28.5-29.1 FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.523A 5.539 MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540					
29.1-29.5 FIXED FIXED-SATELLITE (Earth-to-space) 5.523C 5.523E 5.535A 5.539 5.541A MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540					
29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.539 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space)					
29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.539 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.525 5.526 5.527 5.529 5.540 5.542			29.5-29.9 FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) 5.525 5.526 5.527 5.529	Satellite Communications (25)	
29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.539 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.543 5.525 5.526 5.527 5.538 5.540 5.542			29.9-30 FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) 5.525 5.526 5.527 5.543		

30-31 FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) Standard frequency and time signal-satellite (space-to-Earth)			30-31 FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) Standard frequency and time signal-satellite (space-to-Earth)	30-31 Standard frequency and time signal-satellite (space-to-Earth)	
5.542			G117		
31-31.3 FIXED 5.543A MOBILE Standard frequency and time signal-satellite (space-to-Earth) Space research 5.544 5.545			31-31.3 Standard frequency and time signal-satellite (space-to-Earth)	31-31.3 FIXED MOBILE Standard frequency and time signal-satellite (space-to-Earth)	Fixed Microwave (101)
5.149			US211 US342	US211 US342	
31.3-31.5 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)			31.3-31.8 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive)		
5.340					
31.5-31.8 EARTH EXPLORATION- SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) Fixed Mobile except aeronautical mobile	31.5-31.8 EARTH EXPLORATION- SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)	31.5-31.8 EARTH EXPLORATION- SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) Fixed Mobile except aeronautical mobile			
5.149 5.546	5.340	5.149	US246		
31.8-32 FIXED 5.547A RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth)			31.8-32 RADIONAVIGATION US69 SPACE RESEARCH (deep space) (space-to- Earth) US262	31.8-32 SPACE RESEARCH (deep space) (space-to- Earth) US262	
5.547 5.547B 5.548			5.548 US211	5.548 US211	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
32-32.3 FIXED 5.547A RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) 5.547 5.547C 5.548			32-32.3 RADIONAVIGATION US69 SPACE RESEARCH (deep space) (space-to- Earth) US262 5.548	32-32.3 SPACE RESEARCH (deep space) (space-to- Earth) US262 5.548	
32.3-33 FIXED 5.547A INTER-SATELLITE RADIONAVIGATION 5.547 5.547D 5.548			32.3-33 INTER-SATELLITE US278 RADIONAVIGATION US69 5.548		Aviation (87)
33-33.4 FIXED 5.547A RADIONAVIGATION 5.547 5.547E			33-33.4 RADIONAVIGATION US69 US360 G117		
33.4-34.2 RADIOLOCATION 5.549			33.4-34.2 RADIOLOCATION US360 G117	33.4-34.2 Radiolocation US360	Private Land Mobile (90)
34.2-34.7 RADIOLOCATION SPACE RESEARCH (deep space) (Earth-to-space) 5.549			34.2-34.7 RADIOLOCATION SPACE RESEARCH (deep space) (Earth-to-space) US262 US360 G34 G117	34.2-34.7 Radiolocation Space research (deep space) (Earth-to-space) US262 US360	
34.7-35.2 RADIOLOCATION Space research 5.550 5.549			34.7-35.5 RADIOLOCATION US360 G117	34.7-35.5 Radiolocation US360	
35.2-35.5 METEOROLOGICAL AIDS RADIOLOCATION 5.549					
35.5-36 METEOROLOGICAL AIDS EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) 5.549 5.551A			35.5-36 EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) US360 G117	35.5-36 Earth exploration-satellite (active) Radiolocation Space research (active) US360	

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INTERNATIONAL FOOTNOTES

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5.457A In the bands 5925-6425 MHz and 14-14.5 GHz, earth stations on board vessels may communicate with space stations of the fixed-satellite service. Such use shall be in accordance with Resolution 902 (WRC-03).

5.457B In the bands 5925-6425 MHz and 14-14.5 GHz, earth stations located on board vessels may operate with the characteristics and under the conditions contained in Resolution 902 (WRC-03) in Algeria, Saudi Arabia, Bahrain, Comoros, Djibouti, Egypt, United Arab Emirates, Jordan, Kuwait, Libyan Arab Jamahiriya, Morocco, Mauritania, Oman, Qatar, Syrian Arab Republic, Sudan, Tunisia and Yemen, in the maritime mobile-satellite service on a secondary basis. Such use shall be in accordance with Resolution 902 (WRC-03).

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5.504A In the band 14-14.5 GHz, aircraft earth stations in the secondary aeronautical mobile-satellite service may also communicate with space stations in the fixed-satellite service. The provisions of Nos. 5.29, 5.30 and 5.31 apply.

5.504B Aircraft earth stations operating in the aeronautical mobile-satellite service in the band 14-14.5 GHz shall comply with the provisions of Annex 1, Part C of Recommendation ITU-R M.1643, with respect to any radio astronomy station performing observations in the 14.47-14.5 GHz band located on the territory of Spain, France, India, Italy, the United Kingdom and South Africa.

5.504C In the band 14-14.25 GHz, the power flux-density produced on the territory of the countries of Saudi Arabia, Botswana, Côte d'Ivoire, Egypt, Guinea, India, Iran, Kuwait, Lesotho, Nigeria, Oman, Syrian Arab Republic and Tunisia by any aircraft earth station in the aeronautical mobile-satellite service shall not exceed the limits given in Annex 1, Part B of Recommendation ITU-R M.1643, unless otherwise specifically agreed by the affected administration(s). The provisions of this footnote in no way derogate the obligations of the aeronautical mobile-satellite service to operate as a secondary service in accordance with No. 5.29.

5.505 Additional allocation: in Algeria, Angola, Saudi Arabia, Bahrain, Bangladesh, Botswana, Brunei Darussalam, Cameroon, China, Congo, Korea (Rep. of), Egypt, the United Arab Emirates, Gabon, Guatemala, Guinea, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Japan, Jordan, Kuwait, Lesotho, Lebanon, Malaysia, Mali, Morocco, Mauritania, Oman, Pakistan, the Philippines, Qatar, Syrian Arab Republic, the Dem. People's Rep. of Korea, Singapore, Somalia, Sudan, Swaziland, Tanzania, Chad and Yemen, the band 14-14.3 GHz is also allocated to the fixed service on a primary basis.

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5.506A In the band 14-14.5 GHz, ship earth stations with an e.i.r.p. greater than 21 dBW shall operate under the same conditions as earth stations located on board vessels, as provided in Resolution 902 (WRC-03). This footnote shall not apply to ship earth stations for which the complete Appendix 4 information has been received by the Radiocommunication Bureau prior to 5 July 2003.

5.506B Earth stations on board vessels communicating with space stations in the fixed-satellite service may operate in the frequency band 14-14.5 GHz without the need for prior agreement from Cyprus, Greece, and Malta within the minimum distance given in Resolution 902 (WRC-03) from these countries.

5.508 Additional allocation: in Germany, Bosnia and Herzegovina, France, Italy, The Former Yugoslav Republic of Macedonia, Libyan Arab Jamahiriya, the United Kingdom, Slovenia and Serbia and Montenegro, the band 14.25-14.3 GHz is also allocated to the fixed service on a primary basis.

5.508A In the band 14.25-14.3 GHz, the power flux-density produced on the territory of the countries of Saudi Arabia, Botswana, China, Côte d'Ivoire, Egypt, France, Guinea, India, Iran, Italy, Kuwait,

Lesotho, Nigeria, Oman, Syrian Arab Republic, the United Kingdom and Tunisia by any aircraft earth station in the aeronautical mobile-satellite service shall not exceed the limits given in Annex 1, Part B of Recommendation ITU-R M.1643, unless otherwise specifically agreed by the affected administration(s). The provisions of this footnote in no way derogate the obligations of the aeronautical mobile-satellite service to operate as a secondary service in accordance with No. 5.29.

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5.509A In the band 14.3-14.5 GHz, the power flux-density produced on the territory of the countries of Saudi Arabia, Botswana, Cameroon, China, Côte d'Ivoire, Egypt, France, Gabon, Guinea, India, Iran, Italy, Kuwait, Lesotho, Morocco, Nigeria, Oman, Syrian Arab Republic, the United Kingdom, Sri Lanka, Tunisia and Viet Nam by any aircraft earth station in the aeronautical mobile-satellite service shall not exceed the limits given in Annex 1, Part B of Recommendation ITU-R M.1643, unless otherwise specifically agreed by the affected administration(s). The provisions of this footnote in no way derogate the obligations of the aeronautical mobile-satellite service to operate as a secondary service in accordance with No. 5.29.

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UNITED STATES (US) FOOTNOTES

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US7 In the band 420-450 MHz and within the following areas, the peak envelope power output of a transmitter employed in the amateur service shall not exceed 50 watts, unless expressly authorized by the Commission after mutual agreement, on a case-by-case basis, between the Federal Communications Commission Engineer in Charge at the applicable district office and the military area frequency coordinator at the applicable military base. For areas (e) through (j), the appropriate military coordinator is located at Peterson AFB, CO.

(a) The entire State of New Mexico and Texas west of longitude 104° 00' West;

(b) The entire State of Florida including the Key West area and the areas enclosed within a 322-kilometer (200-mile) radius of Patrick Air Force Base, Florida (latitude 28° 21' North, longitude 80° 43' West), and within a 322-kilometer (200-mile) radius of Eglin Air Force Base, Florida (latitude 30° 30' North, longitude 86° 30' West);

(c) The entire State of Arizona;

(d) Those portions of California and Nevada south of latitude 37° 10' North, and the areas enclosed within a 322-kilometer (200-mile) radius of the Pacific Missile Test Center, Point Mugu, California (latitude 34° 09' North, longitude 119° 11' West).

(e) In the State of Massachusetts within a 160-kilometer (100-mile) radius around locations at Otis Air Force Base, Massachusetts (latitude 41° 45' North, longitude 70° 32' West).

(f) In the State of California within a 240-kilometer (150-mile) radius around locations at Beale Air Force Base, California (latitude 39° 08' North, longitude 121° 26' West).

(g) In the State of Alaska within a 160-kilometer (100-mile) radius of Clear, Alaska (latitude 64° 17' North, longitude 149° 10' West).

(h) In the State of North Dakota within a 160-kilometer (100-mile) radius of Concrete, North Dakota (latitude 48° 43' North, longitude 97° 54' West).

(i) In the States of Alabama, Georgia and South Carolina within a 200-kilometer (124-mile) radius of Warner Robins Air Force Base, Georgia (latitude 32° 38' North, longitude 83° 35' West).

(j) In the State of Texas within a 200-kilometer (124-mile) radius of Goodfellow Air Force Base, Texas (latitude 31° 25' North, longitude 100° 24' West).

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US48 In the band 9000-9200 MHz, the use of the radiolocation service by non-Federal Government licensees may be authorized on the condition that harmful interference is not caused to the aeronautical radionavigation service or to the Federal Government radiolocation service.

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US78 In the mobile service, the frequencies between 1435 and 1525 MHz will be assigned for aeronautical telemetry and associated telecommand operations for flight testing of manned or unmanned aircraft and missiles, or their major components. Permissible usage includes telemetry associated with launching and reentry into the Earth's atmosphere as well as any incidental orbiting prior to reentry of manned objects undergoing flight tests. The following frequencies are shared with flight telemetry mobile stations: 1444.5, 1453.5, 1501.5, 1515.5, and 1524.5 MHz.

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US110 In the band 9200-9300 MHz, the use of the radiolocation service by non-Federal Government licensees may be authorized on the condition that harmful interference is not caused to the maritime radionavigation service or to the Federal Government radiolocation service.

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US217 In the band 420-450 MHz, pulse-ranging radiolocation systems may be authorized for Federal and non-Federal Government use along the shorelines of the contiguous 48 States and Alaska. In the sub-band 420-435 MHz, spread spectrum radiolocation systems may be authorized for Federal and non-Federal Government use within the contiguous 48 States and Alaska. All stations operating in accordance with this provision shall be secondary to stations operating in accordance with the Table of Frequency Allocations. Authorizations shall be granted on a case-by-case basis; however, operations proposed to be located within the following geographic areas should not expect to be accommodated:

- (a) The entire State of New Mexico and Texas west of longitude 104° 00' West;
- (b) The entire State of Florida including the Key West area and the areas enclosed within a 322-kilometer (200-mile) radius of Patrick Air Force Base, Florida (latitude 28° 21' North, longitude 80° 43' West), and within a 322-kilometer (200-mile) radius of Eglin Air Force Base, Florida (latitude 30° 30' North, longitude 86° 30' West);
- (c) The entire State of Arizona;
- (d) Those portions of California and Nevada south of latitude 37° 10' North, and the areas enclosed within a 322-kilometer (200-mile) radius of the Pacific Missile Test Center, Point Mugu, California (latitude 34° 09' North, longitude 119° 11' West).
- (e) In the State of Massachusetts within a 160-kilometer (100-mile) radius around locations at Otis Air Force Base, Massachusetts (latitude 41° 45' North, longitude 70° 32' West).
- (f) In the State of California within a 240-kilometer (150-mile) radius around locations at Beale Air Force Base, California (latitude 39° 08' North, longitude 121° 26' West).
- (g) In the State of Alaska within a 160-kilometer (100-mile) radius of Clear, Alaska (latitude 64° 17' North, longitude 149° 10' West).
- (h) In the State of North Dakota within a 160-kilometer (100-mile) radius of Concrete, North Dakota (latitude 48° 43' North, longitude 97° 54' West).
- (i) In the States of Alabama, Georgia and South Carolina within a 200-kilometer (124-mile) radius of Warner Robins Air Force Base, Georgia (latitude 32° 38' North, longitude 83° 35' West).
- (j) In the State of Texas within a 200-kilometer (124-mile) radius of Goodfellow Air Force Base, Texas (latitude 31° 25' North, longitude 100° 24' West).

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US244 The band 136-137 MHz is allocated to the non-Federal Government aeronautical mobile (R) service on a primary basis, and is subject to pertinent international treaties and agreements. The frequencies 136, 136.025, 136.05, 136.075, 136.1, 136.125, 136.15, 136.175, 136.2, 136.225, 136.25,

136.275, 136.3, 136.325, 136.35, 136.375, 136.4, 136.425, 136.45, and 136.475 MHz are available on a shared basis to the Federal Aviation Administration for air traffic control purposes, such as automatic weather observation stations (AWOS), automatic terminal information services (ATIS), flight information services-broadcast (FIS-B), and airport control tower communications.

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US246 No station shall be authorized to transmit in the following bands:

73-74.6 MHz,
608-614 MHz, except for medical telemetry equipment¹,
1400-1427 MHz,
1660.5-1668.4 MHz,
2690-2700 MHz,
4990-5000 MHz,
10.68-10.7 GHz,
15.35-15.4 GHz,
23.6-24 GHz,
31.3-31.8 GHz,
50.2-50.4 GHz,
52.6-54.25 GHz,
86-92 GHz,
100-102 GHz,
105-116 GHz,
164-168 GHz,
182-185 GHz,
217-231 GHz.

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US252 The bands 2110-2120 MHz and 7145-7190 MHz are also allocated for Earth-to-space transmissions in the space research service, limited to deep space communications at Goldstone, California.

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US258 In the band 8025-8400 MHz, the Earth exploration-satellite service (space-to-Earth) is allocated on a primary basis for non-Federal Government use. Authorizations are subject to a case-by-case electromagnetic compatibility analysis.

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US262 The use of the band 31.8-32.3 GHz by the space research service (deep space) (space-to-Earth) and of the band 34.2-34.7 GHz by the space research service (deep space) (Earth-to-space) are limited to Goldstone, California.

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US276 Except as otherwise provided for herein, use of the band 2360-2385 MHz by the mobile service is limited to aeronautical telemetering and associated telecommand operations for flight testing of manned or unmanned aircraft, missiles or major components thereof. The following three frequencies are shared on a co-equal basis by Federal Government and non-Federal Government stations for telemetering and associated telecommand operations of expendable and reusable launch vehicles whether or not such

¹ Medical telemetry equipment shall not cause harmful interference to radio astronomy operations in the band 608-614 MHz and shall be coordinated under the requirements found in 47 C.F.R. § 95.1119.

operations involve flight testing: 2364.5 MHz, 2370.5 MHz, and 2382.5 MHz. All other mobile telemetering uses shall be secondary to the above uses.

US277 The band 10.6-10.68 GHz is also allocated on a primary basis to the radio astronomy service. However, the radio astronomy service shall not receive protection from stations in the fixed service which are licensed to operate in the one hundred most populous urbanized areas as defined by the 1990 U.S. Census. For the list of observatories operating in this band see 47 C.F.R. § 2.106, footnote US355.

US278 In the bands 22.55-23.55 GHz and 32.3-33 GHz, non-geostationary inter-satellite links may operate on a secondary basis to geostationary inter-satellite links.

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US303 In the band 2285-2290 MHz, non-Federal government space stations in the space research, space operations and Earth exploration-satellite services may be authorized to transmit to the Tracking and Data Relay Satellite System subject to such conditions as may be applied on a case-by-case basis. Such transmissions shall not cause harmful interference to authorized Federal Government stations. The power flux density at the Earth's surface from such non-Federal Government stations shall not exceed -144 to -154 dBW/m²/4 kHz, depending on angle of arrival, in accordance with ITU Radio Regulation 21.16.

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US310 In the band 14.896-15.121 GHz, non-Federal Government space stations in the space research service may be authorized on a secondary basis to transmit to Tracking and Data Relay Satellites subject to such conditions as may be applied on a case-by-case basis. Such transmissions shall not cause harmful interference to authorized Federal Government stations. The power flux-density produced by such non-Federal Government stations at the Earth's surface in any 4 kHz band for all conditions and methods of modulation shall not exceed:

$$\begin{aligned} -148 & \quad \text{dB(W/m}^2\text{)} \text{ for } 0^\circ < \theta \leq 5^\circ \\ -148 + (\theta-5)/2 & \quad \text{dB(W/m}^2\text{)} \text{ for } 5^\circ < \theta \leq 25^\circ \\ -138 & \quad \text{dB(W/m}^2\text{)} \text{ for } 25^\circ < \theta \leq 90^\circ \end{aligned}$$

where θ is the angle of arrival of the radio-frequency wave (degrees above the horizontal). These limits relate to the power flux-density and angles of arrival which would be obtained under free-space propagation conditions.

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US316 The band 2900-3000 MHz is also allocated on a primary basis to the meteorological aids service. Operations in this service are limited to Federal Government Next Generation Weather Radar (NEXRAD) systems where accommodation in the 2700-2900 MHz band is not technically practical and are subject to coordination with existing authorized stations.

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US320 The use of the bands 137-138 MHz, 148-150.05 MHz, and 400.15-401 MHz by the mobile-satellite service is limited to non-voice, non-geostationary satellite systems and may include satellite links between land earth stations at fixed locations.

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US342 In making assignments to stations of other services to which the bands:

13360-13410 kHz,	14.47-14.5 GHz,	145.45-145.75 GHz,
25550-25670 kHz,	22.01-22.21 GHz,	146.82-147.12 GHz,
37.5-38.25 MHz,	22.21-22.5 GHz,	150-151 GHz,
322-328.6 MHz,	22.81-22.86 GHz,	174.42-175.02 GHz,
1330-1400 MHz,	23.07-23.12 GHz,	177-177.4 GHz,
1610.6-1613.8 MHz,	31.2-31.3 GHz,	178.2-178.6 GHz,
1660-1660.5 MHz,	36.43-36.5 GHz,	181-181.46 GHz,

1668.4-1670 MHz,	42.5-43.5 GHz,	186.2-186.6 GHz,
3260-3267 MHz,	48.94-49.04 GHz,	250-251 GHz,
3332-3339 MHz,	93.07-93.27 GHz,	257.5-258 GHz,
3345.8-3352.5 MHz,	97.88-98.08 GHz,	261-265 GHz,
4825-4835 MHz,	140.69-140.98 GHz,	262.24-262.76 GHz,
4950-4990 MHz,	144.68-144.98 GHz,	265-275 GHz
6650-6675.2 MHz,		

are allocated, all practicable steps shall be taken to protect the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 4.5 and 4.6 and Article 29 of the ITU Radio Regulations).

* * * * *

US355 In the band 10.7-11.7 GHz, non-geostationary satellite orbit licensees in the fixed-satellite service (space-to-Earth), prior to commencing operations, shall coordinate with the following radio astronomy observatories to achieve a mutually acceptable agreement regarding the protection of the radio telescope facilities operating in the band 10.6-10.7 GHz:

Observatory	West Longitude	North Latitude	Elevation
Arecibo Observatory.....	.....66° 45' 11"	....18° 20' 46"	.....496 m
Green Bank Telescope (GBT).....	.....79° 50' 24"	....38° 25' 59"	.....825 m
Very Large Array (VLA).....	....107° 37' 04"	....34° 04' 44"	.....2126 m
Very Long Baseline Array (VLBA) Stations:			
Brewster, WA.....	....119° 40' 55"	....48° 07' 53"	.....255 m
Fort Davis, TX.....	....103° 56' 39"	....30° 38' 06"	.....1615 m
Hancock, NH.....	.....71° 59' 12"	....42° 56' 01"	.....309 m
Kitt Peak, AZ.....	....111° 36' 42"	....31° 57' 22"	.....1916 m
Los Alamos, NM.....	....106° 14' 42"	....35° 46' 30"	.....1967 m
Mauna Kea, HI.....	....155° 27' 29"	....19° 48' 16"	.....3720 m
North Liberty, IA.....	.....91° 34' 26"	....41° 46' 17"	.....241 m
Owens Valley, CA.....118° 16' 34"37° 13' 54"1207 m
Pie Town, NM.....108° 07' 07"34° 18' 04"2371 m
St. Croix, VI.....64° 35' 03"17° 45' 31"16 m

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US384 In the band 401-403 MHz, the non-Federal Government Earth exploration-satellite (Earth-to-space) and meteorological-satellite (Earth-to-space) services are limited to earth stations transmitting to Federal Government space stations.

US385 The band 1164-1215 MHz is also allocated to the radionavigation-satellite service (space-to-Earth, space-to-space) on a primary basis. In this band, stations in the radionavigation-satellite service shall not cause harmful interference to, nor claim protection from, stations of the aeronautical radionavigation service.

US386 In designing systems for the inter-satellite service in the band 32.3-33 GHz, for the radionavigation service in the band 32-33 GHz, and for the space research service (deep space) (space-to-Earth) in the band 31.8-32.3 GHz, all necessary measures shall be taken to prevent harmful interference between these services, bearing in mind the safety aspects of the radionavigation service.

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NON-FEDERAL GOVERNMENT (NG) FOOTNOTES

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NG41 Frequencies in the bands 3700-4200 MHz and 5925-6425 MHz, may also be assigned to stations in the international fixed public and international control services located in Puerto Rico, the U.S. Virgin Islands, and Navassa Island.

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NG114 In the Gulf of Mexico offshore from the Louisiana-Texas coast, the band 476-494 MHz (TV channels 15, 16 and 17) is allocated to the Public Mobile and Private Land Mobile Radio Services in accordance with the regulations set forth in 47 C.F.R. parts 22 and 90, respectively.

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FEDERAL GOVERNMENT (G) FOOTNOTES

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G2 In the bands 216-225, 420-450 (except as provided by US217 and G129), 890-902, 928-942, 1300-1400, 2310-2385, 2417-2450, 2700-2900, 5650-5925 and 9000-9200 MHz, the Federal Government radiolocation service is limited to the military services.

* * * * *

G129 Federal Government wind profilers are authorized to operate on a primary basis in the radiolocation service in the frequency band 448-450 MHz with an authorized bandwidth of no more than 2 MHz centered on 449 MHz, subject to the following conditions: 1) wind profiler locations must be pre-coordinated with the military services to protect fixed military radars; and 2) wind profiler operations shall not cause harmful interference to, nor claim protection from, military mobile radiolocation stations that are engaged in critical national defense operations.

PART 25--SATELLITE COMMUNICATIONS

4. The authority citation for Part 25 continues to read as follows:

Authority: 47 U.S.C. 701-744. Interprets or applies Sections 4, 301, 302, 303, 307, 309 and 332 of the Communications Act, as amended, 47 U.S.C. Sections 154, 301, 302, 303, 307, 309 and 332, unless otherwise noted.

5. Section 25.202(a)(3) is revised and new sections 25.202(a)(4)(iii) and 25.202(a)(7) are added to read as follows:

§ 25.202 Frequencies, frequency tolerance and emission limitations.

(a)(1) * * *

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(3) The following frequencies are available for use by the non-voice, non-geostationary mobile-satellite service:

137-138 MHz: space-to-Earth
 148-150.05 MHz: Earth-to-space
 399.9-400.05 MHz: Earth-to-space
 400.15-401 MHz: space-to-Earth

(4) * * *

(iii) The following frequencies are available for use by the L-band Mobile-Satellite Service:

1525-1559 MHz: space-to-Earth

1626.5-1660.5 MHz: Earth-to-space

The use of the frequencies 1544-1545 MHz and 1645.5-1646.5 MHz is limited to distress and safety communications.

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Part 87—AVIATION SERVICES

6. The authority citation for Part 87 continues to read as follows:

Authority: 48 Stat. 1066, 1082, as amended; 47 U.S.C. 154, 303, 307(e) unless otherwise noted.
Interpret or apply 48 Stat. 1064-1068, 1081-1105, as amended; 47 U.S.C. 151-156, 301-609.

7. Section 87.303 is amended by revising paragraph (d)(1) to read as follows:

§ 87.303 Frequencies.

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(d)(1) Frequencies in the bands 1435-1525 MHz and 2360-2385 MHz are assigned primarily for telemetry and telecommand operations associated with the flight testing of manned or unmanned aircraft and missiles, or their major components. The bands 2310-2320 MHz and 2345-2360 MHz are also available for these purposes on a secondary basis. Until January 1, 2007, flight test operations in the band 2385-2390 MHz may continue on a primary basis within 160 km of the nine sites listed in 47 C.F.R. § 2.106, footnote US363. Permissible uses of these bands include telemetry and telecommand transmissions associated with the launching and reentry into the Earth's atmosphere, as well as any incidental orbiting prior to reentry, of manned or unmanned objects undergoing flight tests. In the band 1435-1530 MHz, the following frequencies are shared with flight telemetry mobile stations: 1444.5, 1453.5, 1501.5, 1515.5, 1524.5, and 1525.5 MHz. In the band 2360-2390 MHz, the following frequencies may be assigned on a co-equal basis for telemetry and associated telecommand operations in fully operational or expendable and re-usable launch vehicles, whether or not such operations involve flight testing: 2364.5, 2370.5 and 2382.5 MHz. In the band 2360-2390 MHz, all other mobile telemetry uses are secondary to the above stated launch vehicle uses.

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